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IAN SHANAHAN

A Glimpse into his World-View and Music
through An Analysis of *Cycles of Vega*.

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by

CATHERINE ANNE BEAUMONT.

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1. INTRODUCTION

The interconnection between music and life – life in both the natural and the spiritual, supernatural realms – is central to Ian Shanahan's musical compositions, which then act as lenses through which his world-view can be glimpsed.

1.1 Aims

The aim of this paper is to attain a deeper understanding and clarification of Ian Shanahan's music and the mind behind it. This will be achieved primarily through an examination of *Cycles of Vega* (1988-1990) for e♭ clarinet and percussion. This piece was chosen for analysis because it provides the most recent, sophisticated and complete example of Shanahan's music to date. It clearly reflects the thinking behind his compositional pursuits, and highlights his individual style.

Chapter two focusses on the sources of inspiration, the philosophies and interests behind Shanahan's music. Composers and musical concepts which have influenced Shanahan's compositional style are discussed in chapter three. This is followed by an analysis of *Cycles of Vega* in chapter four. Concluding remarks are found in chapter five.

1.2 Methods

The information for this analytical study was obtained from primary source-material, including interviews with Ian Shanahan, as well as both published and unpublished writings by and about him. Much of the information for chapter four was drawn from interviews with, and from sketches provided by, the composer.

1.3 A Brief Biography of the composer

Ian Shanahan was born on June 13, 1962, and his interest in music began at an early age: at six years old, he began to teach himself the recorder. Soon thereafter, he began composing music, mainly as a result of exposure to (predominantly contemporary) music in concerts, his father's library of tape recordings and Martin Wesley-Smith's ABC Primary School radio show. Shanahan recalls listening to his father's recordings of Messiaen's *Couleurs de la Cité Céleste* (1963) and *Switched on Bach* arranged by Walter Carlos. Wesley-Smith's radio show included children's songs which incorporated special effects created by analog synthesizers and other electronic sound-devices.

Between 1974 and 1979, Shanahan attended Marsden High School in Sydney. He graduated as Dux of the school and achieved a very high HSC result, particularly in music and mathematics.

In 1980, he enrolled in the Bachelor of Music course at The University of Sydney, where he worked towards a double major in Music and Pure Mathematics. He graduated in 1985 with first-class Honours, and was awarded the University Medal. Shanahan's composition teachers were Professor Eric Gross, Peter Sculthorpe and Ian Fredericks (for computer music).

Shanahan's interest in the recorder has been prominent in his work. He has carried out a great deal of research and significantly extended the known capabilities of the instrument. Shanahan's work has specialised particularly in multiphonics and microtones, culminating in a thesis entitled *Recorder Unlimited – A Preliminary Study of the Alto Recorder's Multiphonic Resources*, submitted in April 1993 to The University of Sydney in partial fulfilment of the prerequisites for the Degree of Doctor of Philosophy (in Composition).

Shanahan is actively involved in performances to promote the recorder, particularly in the context of modernist compositions. He has commissioned many composers (both within Australia and overseas) to write for him, and has given numerous performances of their works, as well as lecturing, broadcasting and writing widely about the playing techniques and compositional possibilities of the recorder. During 1987, he was invited as guest composer/performer to the Asian Composers' Forum in Sendai, Japan, where he gave a lecture-recital dealing primarily with new compositional techniques for recorder. In 1988, he was part of the Australian contingent – the only musician – that travelled to Bologna to celebrate the ninth centenary of the University of Bologna. At both of these events, he gave highly praised performances of contemporary Australian recorder music. In recent years Shanahan has had several of his compositions, including his own performances, released on CD. (These are listed in an appended Discography.)

Shanahan has also been an active member serving on numerous music committees: in particular, he was President of the *Fellowship of Australian Composers* from 1989 to 1992, and Secretary/Treasurer of the Australian Branch of the *International Society for Contemporary Music* over the same period. His work experience has included numerous part-time academic positions and residencies in tertiary institutions in N.S.W. and Victoria.

Aside from music, Shanahan's other interests – as conveyed within his Curriculum Vitae – include physics (quantum physics, chaos, astrophysics), esoteric sciences and philosophy, astronomy, cosmology, mathematics, chess problems, theology and metaphysics. As will be seen in the following exegesis of Shanahan's work (and *Cycles of Vega* in particular), these interests are closely interrelated with his musical compositions.

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## 2. THE PHILOSOPHIES AND INTERESTS BEHIND SHANAHAN'S MUSIC

Shanahan's primary research interests include advanced 'philosophical', 'theosophical' and 'scientific' studies.<sup>1</sup> Such pursuits are at the core of Shanahan's compositions. In his *Manifesto* (1990), he regards himself as a "scientist who happens to work with the physical milieu of sound".<sup>2</sup> Shanahan claims, as a composer, not to be concerned with geographical, historical or political influences.<sup>3</sup> He is inspired, rather, by concepts of the whole Universe and its links with science, music and theology, as unified in the 'sacred triangle',<sup>4</sup> of which Shanahan states he is an "ardent devotee of each apex".<sup>5</sup> Shanahan's compositions are, therefore, a reflection of his perception and experience of the Universe, and of his *Weltanschauung*. Through them, he hopes to "forge a personal living musical cosmology".<sup>6</sup> In simpler terms, Shanahan has said to me:

We live in a crazy world. To compose ... is my way of trying to make sense of things, to acquire meaning and purpose.<sup>7</sup>

Shanahan states: "I believe science to be the study and explication of the Physical Laws of [the] Cosmos".<sup>8</sup> Shanahan takes scientific paradigms found particularly in nature, astronomy and cosmology (i.e. the science of the nature, origin and history of the Universe), and tries to invoke them in his own music.

Astronomy, in particular, has proven to be a predominant source of inspiration in several of Shanahan's major works, including *Solar Dust – Orbits and Spirals* (1988), *Arcturus Timespace* (1987), and *Cycles of Vega* (1988-1990). In the programme notes to *Solar Dust*, for example, Shanahan briefly explains how he incorporates the astronomical influence into the music:

The title of the work is derived from some poetry I wrote in 1986, though the sound-world of the piece is intended to evoke the image of a particular "spacescape" painting – I do not recall the artist – in which the planet Saturn is observed through the myriad of ice crystals and other nebulous matter which comprises its rings. Therefore, much of the piece consists of filigree sound-atoms: delicate, subtle and detailed sonic events requiring careful and refined listening, but which also outline a larger macrostructure. (In order for these sounds to be projected adequately, the mandolin must often be amplified in performance.)

The subtitle "Orbits and Spirals" clearly has further astronomical evocations, but also relates to a structural concept in which musical material recurs unchanged (orbits) or is transformed (spirals). This concept is applied at various architectonic levels, from whole phrases and statements down to successive pitches (unison/orbit; different octave/spiral).<sup>9</sup>

In *Cycles of Vega*, Shanahan combined his astronomical and musical interests to choose Vega (*Alpha Lyrae*), the brightest star in the musically named constellation Lyra, as the metaphorical centrepiece of the composition. He explains in his programme annotation that Vega "will become the Earth's north celestial pole star around 14,000 A.D., since the Earth's polar axis inexorably describes, or cycles through, a circle in the sky every 25,800 (or so) years".<sup>10</sup> This

rotational process is referred to in astronomy and celestial mechanics as ‘precession’.<sup>11</sup> In *Cycles of Vega*, Shanahan uses “extended and complex multi-level cyclic transformations”<sup>12</sup> to emulate this long-range, quasi-cyclic, precessional process.

As the title suggests, the use of cyclic structures within *Cycles of Vega* is a prominent characteristic of the piece. There are many levels within the overall structure which relate to temporal, timbral and pitch aspects; all are based upon cyclical principles.

The macrostructure of *Cycles of Vega* is defined primarily by temporal aspects. The work falls into three main sections – i.e. section one: bars 4-35; section two: bars 40-177; section three: bars 180-214 – with an introduction, two bridging passages, and a coda at bars 1-3, bars 36-39, bars 178-179, and bars 206-218, respectively. Each of these sections is formed by a long-range cycle which uses a repeating rhythmic pattern as its basis, similar to the isorhythmic procedures of the fourteenth-century *Ars Nova*. The rhythmic pattern in each cycle is coloured by a set combination of timbres and pitches selected from the available percussion instruments and clarinet techniques.

The long-range cycles upon which each main section is based also have a series of subcycles (or epicycles) within them – ‘wheels-within-wheels’, as in the workings of an orrery – forming part of the microstructure of *Cycles of Vega*. An example of epicycles is found in the organization of pitches in the clarinet part of section one (bars 4-35), in which a series of sixteen pitches is played through five times. Within the series, however, smaller groups of three or four pitches rotate among themselves. (This is explained in further detail in 4.5.1.)

In my discussions with Shanahan, he has suggested that the cycles within *Cycles of Vega* relate not *only* to the revolution of celestial objects, but to all cycles occurring in the natural world. The musical cycles are analogous to the cyclic geometries of Chaos Theory,<sup>13</sup> and fractals<sup>14</sup> that are now used to model events in nature. Such events in nature include, for example, the biological rhythms within living beings, the seasons, the tides, etc. There is also a parallel between the rhythmic, timbral and pitch-cycles in *Cycles of Vega* and the recurring sound-patterns heard in nature, such as the quasi-repetitive calls of birds and insects in the bush. Links with cosmology in *Cycles of Vega* are implied through Shanahan’s choice of instrumentation, including an array of eighteen windchimes, which physically exemplify Chaos Theory through their random acoustical behaviour:

The fascinating stochastic processes at work within the windchimes themselves – a prominent element of the piece, simply because they are so numerous – provide a metaphorical mirror for the chaos of the Cosmos itself: Cosmological Entropy, Chaos Theory and the 2nd Law of Thermodynamics, as well as the random chaotic perturbations in the Earth’s precession phenomenon itself (“nutation”). (These concepts are beautifully encapsulated in James Joyce’s neologism “chaosmos”!)<sup>15</sup>

The keyword in the above description is ‘Entropy’, which is a measure of the degree of disorder within a system. The disorder in the Universe is supposedly linked with Chaos Theory, which is an attempt by mathematicians to explain the randomness in some natural occurrences. It is impossible, for example, to predict

weather patterns exactly, or the precise position of rain drops falling from a tree after a storm. Similarly, when a windchime is struck, it is not possible to predict which chimes will strike each other, or in what order.

Silence is also an important element in *Cycles of Vega* – and in all of Shanahan’s music in general. The use of silence was partly inspired by Blaise Pascal:

*Le silence éternel des espaces infinis m’effraie.*<sup>16</sup>

The use of silences – periods of inactivity, perhaps leaving only a residue of resonances – is particularly striking in *Arcturus Timespace*, and the composer quotes Pascal in his programme notes:

This wonderful line – ‘The eternal silence of infinite space terrifies me’ – has provided me with certain images which *Arcturus Timespace* attempts to capture ... I am constantly awed when I look at the clear night sky with all of its breathtaking beauty, brilliance and grandeur, realizing that I am looking through both ‘infinite’ space and time.<sup>17</sup>

The music to *Arcturus Timespace* is accompanied by “slide projections [which] consist of various stars, star systems, nebulae, galaxies, gas clouds and sheets ...”.<sup>18</sup> The long silences in the piece allow the audience time to contemplate the images before them.

In *Cycles of Vega*, the sounds seem to emerge from, and fade away into, silence. Shanahan says that he uses both sounds and silence as “meditative tools”,<sup>19</sup> for periods of silence or inactivity give his music ‘space’, thus allowing the audience to contemplate the sounds they hear.

Returning to the concept of the ‘sacred triangle’, we see that *Cycles of Vega* contains numerous examples of the way Shanahan combines his interests in science and music. Finally, he also makes reference to the Creator, stating, about the sound-world of *Cycles of Vega*, that “I try to evoke ... an extremely unearthly, timeless, cosmic, astral state: the work is intended to celebrate the grandeur of God’s Universe”.<sup>20</sup>

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Endnotes

1. The definitions of the following terms are stated as understood by Shanahan:

Philosophy: "1. The use of reason and argument in seeking truth and knowledge of reality, especially of the causes and nature of things and of the principles governing existence, the material universe, perception of physical phenomena, and human behaviour ... 3. advanced learning in general." *Concise Oxford Dictionary*, 1990.

Theosophy: "any of various philosophies professing to achieve a knowledge of God by spiritual ecstasy, direct intuition, or special individual relations." The term comes from the Greek word *theosophos* meaning 'wisdom concerning God'. *Concise Oxford Dictionary*, 1990.

Science: "systematic and formulated knowledge, the pursuit of this, the principles regulating such pursuit ..." *The Australian Pocket Oxford Dictionary*, 1988.

2. Shanahan (October 1990), p.1. This claim is related to Shanahan's deep interest in science and mathematics. He combines such pursuits with music in his compositions. Such interrelations are emphasized by the fact that as a student at The University of Sydney, he took a double major in Music and Pure Mathematics.

3. Shanahan (*Arcturus Timespace*, programme note, 1987):

Is it therefore not surprising that, as a composer, I am not really concerned with the deification of music history and the attendant compositional supplication before musical idols of the past, petty nationalisms, politics and all that is mundane, but more with the mystical and sacramental, spirituality, technology and, in particular, the infinite extension of sonic and artistic possibilities? I am a musician who looks only to the future, and the future of Humanity is OUT THERE.

4. The 'sacred triangle' is a concept derived from the *quadrivium* of the Middle Ages, wherein scholars of this period studied *musica* (music), *astrologia* (astronomy), *geometria* (geometry), and *arithmetica* (arithmetic). Shanahan's 'sacred triangle' embraces *musica*, *scientia* (knowledge, or science), and *theologia* (theology). He feels that *scientia* and *theologia*, taken together, subsume the *quadrivium*'s disciplines of *astrologia*, *geometria* and *arithmetica*.

5. Shanahan (October 1990), p.1.

6. *ibid.* Cosmology: "study or philosophy of Universe as an ordered whole". *The Australian Pocket Oxford Dictionary*, 1988.

7. Shanahan (Interview, September 1993).

8. Shanahan (October 1990), p.2.

9. Shanahan (*Solar Dust*, programme note, 1988).

10. Shanahan (*Cycles of Vega*, programme note, 1990).

11. Precession: "The result of a coupled motion imparted to a spinning body which causes rotation around the axis of spin prescribing a cone in the process". Baker (1978), p.279.

12. Shanahan (October 1990), p.2.

13. Stewart (1990), p.5:

Some innate impulse makes humankind strive to understand the regularities in nature, to seek the laws behind the wayward complexities of the universe, to bring order out of chaos.

There is no short all-encompassing definition of Chaos Theory. For a clearer understanding of this concept, the book *Does God Play Dice? The New Mathematics of Chaos* by Ian Stewart is highly recommended. Although further reading is necessary, Stewart (*op. cit.*, pp.16-17) includes in his book a dictionary definition of 'Chaos':

Like all buzzwords, this one doesn't have the same connotations that it would in everyday use. Compare the dictionary:

Chaos ('keios) n. 1. (Usu. cap.) The disordered formless matter supposed to have existed before the ordered universe. 2. Complete disorder, utter confusion.

To these, the makers of new dictionaries will have to append the buzzword definition. The one below was proposed, after some initial discomfort, at a prestigious international conference on chaos held by the Royal Society in London in 1986. Although everybody present knew what they thought 'chaos' meant – it was their research field, so they really ought to have known – few were willing to offer a precise definition. This isn't unusual in a 'hot' research area – it's hard to define something when you feel you still don't fully understand it. At any rate, here it is:

3. (Math.) Stochastic behaviour occurring in a deterministic system.

That's two more buzzwords – 'stochastic' and 'deterministic' ... 'Stochastic' means 'random'. To understand the phenomenon of chaos we shall need to discuss their meanings further, because in its present form the definition is a paradox. Deterministic behaviour is ruled by exact and unbreakable law. Stochastic behaviour is the opposite: lawless and irregular, governed by chance. So chaos is 'lawless behaviour governed entirely by law'.

14. Fractal: a term invented by Benoît Mandelbrot, describing an object that continues to exhibit detailed structure over a large range of scales. This involves the concept of 'self-similarity'. For example: a tiny piece of coastline, magnified ten times, still looks like a coastline. In contrast, a circle becomes a straight line when viewed on a large enough scale: it is, therefore, not a fractal.
15. Shanahan (*Cycles of Vega*, programme note, 1990).
16. Shanahan (*Arcturus Timespace*, programme note, 1987).
17. *ibid.*
18. *ibid.*
19. Shanahan (Interview, June 1993).
20. Shanahan (*Cycles of Vega*, programme note, 1990). Astral state: the term 'astral' has a double meaning. In the context of Shanahan's statement, both meanings are intended by the composer: (a) of, or connected with, the stars; (b) Theosophy relating to, or arising from, a supposed ethereal existence. *Concise Oxford Dictionary*, 1990.

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### 3. INFLUENCES ON SHANAHAN'S MUSICAL LANGUAGE

This chapter examines the links between the music of Shanahan and other composers who have influenced him, or who are stylistically confluent with him.

#### 3.1 Olivier Messiaen

Perhaps the most pertinent single influence on Shanahan's music is the work of Olivier Messiaen (1908-1992). Shanahan acknowledges that Messiaen's achievements and methods, especially in the field of rhythmic composition, have made a significant impression on his own compositional techniques and style, particularly with regard to his techniques based upon a *chronos protos* or 'primary time' unit.

*Chronos protos* is a term derived from the Greek, 'chronos' meaning 'time', and 'protos' meaning 'primary' or 'first'. This 'primary time' is the indivisible unit, or time-atom, that underlies all temporal music. The Ancient Greeks thought of larger rhythmic units in terms of the number of *chronos protoi* they contained:

Thus the *chronos protos* provided the constant or nucleus to which all values were related, thereby creating a type of unity within all temporal movement. The organization of the very small thus established the larger patterns.<sup>1</sup>

Among twentieth-century composers, Messiaen has led the way in the use of the *chronos protos* type of rhythmic organization, and has developed a large variety of techniques based upon this concept. The earliest examples were his development, during the early 1940s, of "chromatic" rhythms<sup>2</sup> arising from a primary time-value; then, a few years later, he created "interversions",<sup>3</sup> or manipulations of rhythmic patterns, and "modal" rhythms which were also organized in a similar manner. During the 1960s, Messiaen added a technique to his *chronos protos* vocabulary that he called "permutation". This concept represents one of the most complex uses of the *chronos protos* technique, examples of which can be found in *Île de Feu II* (ca.1950), *Chronochromie* (1960), *Couleurs de la Cité Céleste* (1963), *Sept Haïkai* (ca.1962), and *Et Exspecto Resurrectionem Mortuorum* (1964).

A similar system of permutation is also found in Shanahan's pieces *Echoes/Fantasies* (1984) and *Cycles of Vega* (1988-1990).

Permutation, as applied to both Messiaen's and Shanahan's works, describes a type of symmetrical re-arranging of the order of a given series or row of numbers. Once begun, a permutation is reiterated upon itself until the original series is once again attained. The number of distinct permutations is determined both by the number of elements in the original series, and by the order selected for the first permutation.



To illustrate this process, a set of durations is selected and numbered: 1 to 5, for example. These are re-arranged, or permuted, in an arbitrary order to obtain permutation I (e.g. [3, 5, 2, 1, 4]). Each number (i.e. representative of a duration) is then taken as referring to the position inside permutation I, the initial 3 referring to the third number (2), 5 to the fifth number (4), 2 to the second number (5) thus producing permutation II: [2, 4, 5, 3, 1] – and so on. All of the permutations for this set of durations are shown in Ex.3-1:

**Ex.3-1. An example of the process of re-iterated permutation.**

(a) A set of durations is selected, for example:

[1, 2, 3, 4, 5]

(b) These durations are re-arranged so as to obtain permutation I:

[3, 5, 2, 1, 4]

(c) The total number of distinct permutations obtained by applying permutation I to itself repeatedly is dictated by:

(i) The number of durations comprising the set, and

(ii) The ordering of the durations in permutation I.

(d) The group of distinct permutations deriving from permutation I:

[1, 2, 3, 4, 5]

[3, 5, 2, 1, 4]

[2, 4, 5, 3, 1]

[5, 1, 4, 2, 3]

[4, 3, 1, 5, 2]

Cyclic Group notation: (1, 3, 2, 5, 4) – i.e. 1 becomes 3 becomes 2 becomes 5 becomes 4

In creating his permutations, Messiaen first selected a series of durations. In *Chronochromie*, for example, he selected thirty-two “chromatic” durations. (This is simply a set of multiples of a basic *chronos protos*, increasing in length: 1  $\times$  *chronos protos*, 2  $\times$  *chronos protos*, 3  $\times$  *chronos protos*, ... 32  $\times$  *chronos protos*.) Then he arranged them in a series which became Permutation I. The total number of permutations of thirty-two durations is prodigious; in order to limit them according to a system, Messiaen divided the thirty-two durations into five subgroups. The first subgroup has one value (27), the second has three (19, 20, 21), the third has four (2, 28, 11, 8), the fourth has six (1, 10, 26, 7, 5, 3), and the fifth has eighteen (all of the remaining duration: (4, 22, 18, 17, 16, 15, 29, 25, 9, 13, 32, 6, 24, 12, 31, 23, 14, 30)). The permutations in each subgroup were then rotated cyclically amongst themselves, giving a total number of permutations equal to the lowest common multiple of the number of duration-elements within

each subgroup (i.e., l.c.m.  $\{1, 3, 4, 6, 18\} = 36$ ).<sup>4</sup> The arrangement of permutations in *Chronochromie* is shown in Ex.3-2:

**Ex.3-2. Table of permutations used by Messiaen in *Chronochromie*.**

based on Sherlaw Johnson (1984), p.177.

Cyclic Group = (1, 10, 26, 7, 5, 3) (2, 28, 11, 8) (4, 22, 18, 17, 16, 15, 29, 25, 9, 13, 32, 6, 24, 12, 31, 23, 14, 30) (19, 20, 21) (27)

Permutation 1 = [10, 28, 1, 22, 3, 24, 5, 2, 13, 26, 8, 31, 32, 30, 29, 15, 16, 17, 20, 21, 19, 18, 14, 12, 9, 7, 27, 11, 25, 4, 23, 6];

Permutation 2 = [26, 11, 10, 18, 1, 12, 3, 28, 32, 7, 2, 23, 6, 4, 25, 29, 15, 16, 21, 19, 20, 17, 30, 31, 13, 5, 27, 8, 9, 22, 14, 24];

...

Permutation 31 = [3, 8, 5, 30, 7, 32, 26, 11, 25, 1, 28, 24, 9, 23, 16, 17, 18, 22, 21, 19, 20, 4, 31, 6, 29, 10, 27, 2, 15, 14, 12, 13];

Permutation 32 = the initial duration-series = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32].

Similarly, in *Cycles of Vega*, Shanahan permutes a series of durations largely – yet not entirely – based upon a *chronos protos*. But rather than adopting the “chromatic” series of durations used by Messiaen, Shanahan took the semiquaver unit as the *chronos protos*, and composed twenty-nine original durations of varying lengths. A feature of this series is the inclusion of so-called ‘irrational’ values.<sup>5</sup> The use of irregular durations formed by introducing ‘irrational’ subdivisions is a technique used frequently by Boulez, Ferneyhough, and others.

The twenty-nine durations (R: labelled 1 to 29) were re-arranged in order to give the first permutation,  $\Theta(R)$ . The durations in their original order and their permuted order are shown in Ex.3-3:

**Ex.3-3. *Cycles of Vega*: the series of twenty-nine durations, and its first permutation.**

|                    |        |       |         |          |         |         |          |         |     |       |
|--------------------|--------|-------|---------|----------|---------|---------|----------|---------|-----|-------|
| ordinal numbers:   | 1      | 2     | 3       | 4        | 5       | 6       | 7        | 8       | 9   | 10    |
| their durations: * | 4.♩    | 6.♩   | 1.333.♩ | 5.667.♩  | 8.♩     | 3.♩     | 2.♩      | 12.♩    | 1.♩ | 3.2.♩ |
| ordinal numbers:   | 11     | 12    | 13      | 14       | 15      | 16      | 17       | 18      | 19  | 20    |
| their durations: * | 20.4.♩ | 6.4.♩ | 2.♩     | 7.♩      | 4.571.♩ | 1.143.♩ | 12.857.♩ | 3.429.♩ | 2.♩ | 5.♩   |
| ordinal numbers:   | 21     | 22    | 23      | 24       | 25      | 26      | 27       | 28      | 29  |       |
| their durations: * | 2.♩    | 3.♩   | 2.667.♩ | 18.333.♩ | 10.♩    | 7.♩     | 11.♩     | 14.♩    | 9.♩ |       |

\* NB: certain 'irrational' durations' values herein – i.e. every one of those time-spans involving triplets or septuplets – have been rounded off to three decimal places.

R = the initial series of twenty-nine durations, [1, 2, 3, 4, ..., 27, 28, 29].

$\Theta(R)$  = permutation I = [2, 20, 21, 22, 29, 7, 27, 28, 9, 12, 10, 11, 24, 4, 18, 15, 16, 17, 1, 19, 23, 3, 13, 14, 8, 6, 25, 26, 5].

As was the case for Messiaen, the number of permutations for a series of twenty-nine durations is enormous. Shanahan, therefore, divided them into seven subgroups as follows: (1, 2, 20, 19), (9), (5, 29), (6, 7, 27, 25, 8, 28, 26), (3, 21, 23, 13, 24, 14, 4, 22), (10, 12, 11), (15, 18, 17, 16).

These subgroups were not chosen and arranged purely by random selection, for certain factors dictated the positioning of the numbers within parentheses.

The first factor involved grouping of the 'irrational' durations. This included the triplets {3, 4, 23, 24}, quintuplets [i.e. 5:4] {10, 11, 12}, and septuplets [i.e. 7:4] {15, 16, 17, 18}. The percussion part in *Cycles of Vega* embraces several layers of permutations which have been superimposed on top of one another. Therefore, for the purpose of notation and performability, these irrational durations must circulate only amongst themselves. Shanahan encountered this same problem while he was composing *Echoes/Fantasies*, which is also based upon a system of permutations of pre-composed durations, with its series of twenty-eight durations (including 'irrational' triplet and quintuplet durations). In his own analysis of *Echoes/Fantasies*, Shanahan explains the reasons for grouping these 'irrational' durations together:

These [irrational durations] cannot be arbitrarily permuted amongst different types of irrational values (triplets amongst septuplets, for example) or amongst "rational" durations *when two or more rhythmic layers are superimposed and bound together by a single system of barlines*. The results would be, I think, practically un-notatable under our present notational system and would be inordinately difficult for human performers in the event that the result was notated! (Of course, electronics could handle the situation.) Hence, in this piece, such groups of irrational durations are, of necessity, permuted *amongst themselves* ...<sup>6</sup>

As a result of the above factors, the irrational durations in *Cycles of Vega* were also permuted amongst themselves, giving rise to the subgroups (3, 21, 23, 13, 24, 14, 4, 22), (10, 12, 11) and (15, 18, 17, 16). The remaining 'rational' durations, all being straightforward multiples of the *chronos protos*, could then be freely permuted amongst themselves with much less difficulty.

As was shown in Ex.3-2, Messiaen had 36 distinct permutations to work with for *Chronochromie*. The lowest common multiple of the lengths of the seven subgroups selected by Shanahan, however, is 168, meaning that the number of possible permutations was still quite large. The seven subgroups, however, yield permutations within themselves which total 29. Shanahan, therefore, selects permutations from within these individual subgroups, and then links them together in order to make longer rhythmic patterns as required. The twenty-nine possible permutations of the subgroups – the 'subpermutations' of R – are shown in Ex.3-4:

### Ex.3-4. Table of the twenty-nine subpermutations of R.

| 'Subpermutations' of $\xi$               | <i>Chronos Protoi</i> | Epicycle Spans | 'Subrhythms' of R: $R_k, 1 \leq k \leq 7$                  |
|------------------------------------------|-----------------------|----------------|------------------------------------------------------------|
| $\xi_1 = (1, 2, 20, 19)$                 |                       | 17             | $R_1 = (\xi_1)^0 = [1, 2, 19, 20]$                         |
| $\xi_2 = (9)$                            |                       | 1              | $R_2 = (\xi_2)^m = [9], \text{ for all } m \in \mathbb{N}$ |
| $\xi_3 = (5, 29)$                        |                       | 17             | $R_3 = (\xi_3)^0 = [5, 29]$                                |
| $\xi_4 = (6, 7, 27, 25, 8, 28, 26)$      |                       | 59             | $R_4 = (\xi_4)^0 = [6, 7, 8, 25, 26, 27, 28]$              |
| $\xi_5 = (3, 21, 23, 13, 24, 14, 4, 22)$ | ; third $\times$      | 42             | $R_5 = (\xi_5)^0 = [3, 4, 13, 14, 21, 22, 23, 24]$         |
| $\xi_6 = (10, 12, 11)$                   | ; fifth $\times$      | 30             | $R_6 = (\xi_6)^0 = [10, 11, 12]$                           |
| $\xi_7 = (15, 18, 17, 16)$               | ; seventh $\times$    | 22             | $R_7 = (\xi_7)^0 = [15, 16, 17, 18]$                       |

NB:  $\xi^2(R_5) = \xi[\xi(R_5)]$  i.e. the outcome of  $\xi$  acting upon  $\xi(R_5)$ ;

$\xi^3(R_5) = \xi[\xi^2(R_5)] = \xi^2[\xi(R_5)] = \xi\{\xi[\xi(R_5)]\}$ , etc.

Finally, Shanahan's treatment of rhythm reflects Messiaen's statement that:

Schematically, rhythmic music is music that scorns repetition, straightforwardness and equal divisions. In short, it's music inspired by the movements of nature, movements of free and unequal durations.<sup>7</sup>

## 3.2 The Extension of Sonic Availability

I refuse to submit myself only to sounds that have already been heard. (Edgard Varèse)<sup>8</sup>

Like Varèse before him, a key concern in Shanahan's music is "the infinite extension of sonic and artistic possibilities".<sup>9</sup> In the introduction to *Recorder Unlimited*, he writes:

Amongst forward-thinking Western musicians of today, the attitude towards sound and silence as the basic fabric of music has been governed by a new, post-Modernist aesthetic. All sound-producers are treated as musical instruments which are then, in turn, regarded purely as sound-sources or generators in an attempt to find the full extent of their acoustic potential. Such a notion usually entails the expansion of instrumental performance techniques to an absolute limit, where applicable. Musical instruments are now being scrutinized independently of any particular musical style, because the formulation of criteria by which instrumental sounds and playing techniques may be said to be intrinsically musical or unmusical has been rendered irrelevant. All instrumental capabilities are now, in themselves, artistically valid, and are freely available to be selected and utilized by all musicians as they see fit: instruments and sounds have been "unlimited".<sup>10</sup>

The primary influence for the notion of 'sounds unlimited' stems from the work of American experimental composers such as Charles Ives (1874–1954), Edgard Varèse (1883–1965), Henry Cowell (1897–1965), George Antheil (1900–1959), and John Cage (1912–1992), all of whom experimented with new materials and new ways of organizing sound.

Precursors even to the Americans, however, were the Italian Futurists, who belonged to a movement which began in 1909, and whose name reflected the emphasis they placed on the future and on new ideas in the arts. The Futurists introduced the concept that ‘noise’<sup>11</sup> could be incorporated into musical compositions, and gave concerts of ‘noises’. The painter Luigi Russolo, for example, incorporated ‘noisemakers’ such as sirens and automobile parts into his compositions, as well as building a noise machine.

During the 1920s the American composers, in particular, absorbed these ideas. A period of extensive exploration followed, which extended throughout the 1930s and 1940s. As a result, new musical ideas were formed including: the isolation of the individual acoustic event; the extension of sonic material to include the entire possible range of aural sensation; the notion that all sounds are of equal aesthetic value; and that the duration, loudness and timbre of a sound are just as important as fixed pitch. In addition, control of the sound-world within a piece is possible at every level, from total pre-determination, to improvisation, to randomness or indeterminacy.

Essentially, the composers of this period began to broaden the available timbral palette of Western music by absorbing the element of what was traditionally regarded as ‘noise’<sup>12</sup> into their works. Of particular interest is the development of works written for “large batteries of noise-like percussion instruments”.<sup>13</sup> These include George Antheil’s *Ballet mécanique* (1923–1925) for percussion, pianola, and an aeroplane propeller, and *Ionisation* (1931) by Edgard Varèse, for percussion orchestra, including sirens, bells and an anvil. A significant aspect of this piece is the role of timbre, rhythm and accent. Unlike traditional Western music, where the elements of melody and harmony are the all-powerful generators of form, in *Ionisation*, the sonority of percussion instruments, the rhythmic form, and accent are structurally essential to the work.

The use of timbre and rhythm to define structural elements within a piece is characteristic of Shanahan’s music, and of *Cycles of Vega* in particular. Although harmony and pitch are both important elements in this work, they have little significance on the overall structure of the piece, which is defined purely by temporal designs. The predominant features of *Cycles of Vega* are the rhythmic and timbral qualities achieved through an unusual combination of percussion instruments and the use of extended techniques in the clarinet part.

The percussion ensemble in *Cycles of Vega* is unique (Ex.3-5). It includes eighteen varieties of windchimes, seven Japanese Temple Bells (*rin*), a vibraphone, and numerous other metallic percussion instruments. Of particular interest is a set of “tubular metal sound-sources [which Shanahan] constructed and assembled [him]self”<sup>14</sup> – hence their name “Shan Tubes”. With the exception of the *rin*, crotales, vibraphone and cow bells, all percussion instruments are relatively unpitched, thus negating somewhat the role of pitch as a structural force within the piece. The random nature of the windchimes also gives a sense of local unpredictability. Shanahan suggests that:

Some of these instruments’ microtonal tunings, and the clarinet’s technical treatment in general, additionally indicate an attempt ‘to look ahead’ musically and aesthetically,

liberated from the artificial restrictions of the past.<sup>15</sup>

**Ex.3-5. *Cycles of Vega*, Notes for the Performers: “The instruments and their physical disposition”.**

• ***Sopranino Clarinet in e♭***

• ***Percussion (2 players)***

**Percussion 1**

- vibraslap {at rest on the mallet-tray}
- large autocoil {suspended high}
- very large triangle {suspended high}
- crotales (one octave set) {rack-mounted}
- vibraphone (*optional*: employ an assistant to regulate its rate of vibrato)
- 4 cowbells {rack-mounted}
  - 2 agógo bells
  - 2 cencerros
- 6 large-diameter “Shan Tubes” {suspended very high} \*
- 3 suspended cymbals {all suspended on cymbal stands, but ideally grouped together in vertical order upon a single cymbal stand} †
  - 1 large sizzle cymbal
  - 1 large Chinese cymbal
  - 1 very large (Turkish) suspended cymbal

**Percussion 2**

- 3 suspended cymbals {all suspended on cymbal stands, but ideally grouped together in vertical order upon a single cymbal stand} †
  - 1 large sizzle cymbal
  - 1 large Chinese cymbal
  - 1 very large (Turkish) suspended cymbal
- dove call in C {hanging from a string, around the percussionist’s neck!}
- vibraslap {at rest on the table with the *rin*}
- 8 windchimes, activated mainly by the percussionist’s right hand {all suspended high}
  - 1 aluminium-tube windchime
  - 1 ceramic-disc windchime
  - 1 brass-bell windchime
  - 1 shell-disc windchime
  - 1 wooden-rod windchime
  - 1 bamboo-tube windchime
  - 1 sea-urchin-spine windchime
  - 1 herd-bell windchime
- ‘triangle windchime’ (3 triangles) {suspended high}
- 6 small-diameter “Shan Tubes” {suspended very high} \*
- 7 Japanese temple bells (*rin*) {resting upon their traditional cushions, on a (cloth-covered) table}
- sleighbells {suspended high}
- 9 windchimes, activated mainly by the percussionist’s left hand {all suspended high}
  - 1 wooden-rod windchime

- 1 bamboo-tube windchime
- 1 sea-urchin-spine windchime
- 1 shell-disc windchime
- 1 'Kenyan bell tree'
- 1 ceramic-disc windchime
- 1 brass-tube windchime
- 1 aluminium-tube windchime
- 1 brass-disc windchime
- very large tam-tam {suspended in a frame}

Note: technical specifications with detailed descriptions of all of these percussion instruments shall be given later; I have also appended to these Performance Notes a comprehensive diagram depicting their *physical layout*.

\* Both sets of “Shan Tubes” require *very high* stands – reaching at least 2 metres above the floor! The “Shan Tubes” themselves are suspended in much the same manner as a set of commercially manufactured tubular bells, from many small hooks screwed into a pair of flat home-made rectangular wooden racks. However, in performance, these suspension-racks *must* be placed close enough together so that each set of “Shan Tubes” physically interacts with the other set, as a kind of single ‘super windchime’, at the climax of **Cycles of Vega** (bar 177).

† Note that until bar 39 in **Cycles of Vega**, both percussionists are able to share the same set of three (suspended) cymbals: duplicate instruments are therefore not needed (although their presence would serve to expand this composition’s timbral spectrum).

Shanahan’s treatment of the *eb* clarinet in *Cycles of Vega* is far from traditional. Not being satisfied with the standard techniques available for the instrument, he explored several new approaches. His methods are explained in his following statement:

The resources of all musical instruments have now expanded to include conventional and unconventional elements, incorporating many capabilities which were formerly unknown or unused, as well as those that may be treated as extensions of established technical resources. Contemporary, post-Modernist aesthetics permits the view that any instrumental potentiality is capable of legitimate artistic application: unconventional sonic devices are now accepted as viable material for contemporary composition. Well-established concepts regarding the fundamental nature of musical instruments have consequently required radical re-evaluation. Since there already exists a substantial corpus of music utilizing non-traditional performance techniques (which will doubtless continue to be employed), an attempt to examine and realize their full potential is both appropriate and timely.<sup>16</sup>

Shanahan has been consistent in exploring the latent possibilities of the instruments for which he composes. This is evident from the sketches to other pieces such as *Echoes/Fantasies* (1984) for bass clarinet, vibraphone and tubular bells; *Arcturus Timespace* (1987) for amplified mandolin and percussion, tape slide and light projection; and *Solar Dust – Orbits and Spirals* (1988), also for amplified mandolin. These latter two pieces for mandolin are notable for their amplification of a non-electronic instrument. Aided by modern technology, this simple idea transforms the nature of the mandolin, extending its timbral palette, and eliminating barriers of dynamic audibility created by the instrument’s traditional resources and inherent quietness. Shanahan’s pre-doctoral thesis, *Recorder*

*Unlimited: A Preliminary Study of the Alto Recorder's Multiphonic Resources* is, of course, the most thorough example of his research into an instrument's sound-world. Referring to the compositional process, Shanahan states:

I prefer to be limited by choice, rather than through ignorance of what sonic resources I have available.<sup>17</sup>

Shanahan clearly and exhaustively explains, in his preface to the score of *Cycles of Vega*, all of the non-standard performance techniques required from the clarinetist (Ex.3-6). Multiphonics and key vibrati are written out with their correct fingerings, and fingering tablatures are provided beneath the staff within the score. This is particularly important for key vibrati (timbre trills), as the alternation of timbres on one pitch sounds different according to which fingerings are used. Jaw vibrato, pitch-bends and a technique called 'teeth on reed' are also employed. Shanahan gives the following instructions for executing this last effect:

Teeth-on-reed. By placing your lower teeth directly upon the  $\text{e}\flat$  clarinet's reed, project a thin, piercing, rather unstable but extremely high-pitched (indeterminate) sound; include changes in embouchure-pressure as well. Then scrape your lower teeth up and down over the reed's surface, to create a rough 'broken portamento' effect, including random changes of partial. End the event on as high a pitch as possible, as shown. (Note that such sound-production activities evolve independently of fingering considerations.)<sup>18</sup>

Whilst this technique is used only twice in the whole piece (at bars 39 and 208), its effect is quite brilliant, producing an extremely piercing sound.

### **Ex.3-6. *Cycles of Vega*, Notes for the Performers: "The Sopranino Clarinet in $\text{E}\flat$ : details".**

## **2. THE SOPRANINO CLARINET IN $\text{E}\flat$ : DETAILS**

### *$\text{E}\flat$ CLARINET FINGERINGS*

Every fingering-indication provided within the score of ***Cycles of Vega*** that *supplies the notated pitch(es) accurately over the given duration* is to be strictly adhered to: any modifications of such fingerings are forbidden! But whenever a fingering yields an unacceptably inaccurate outcome, or is acoustically untenable on a particular instrument, then the clarinetist is at liberty to alter that fingering – subject to the proviso that the resultant sonority matches, as closely as possible *in context*, the composer's original intention. (If no such fingering exists, then just do your best with the provided fingering.) So, whatever fingerings end up being employed herein, the sonic results must always correspond as closely as possible to the notated pitches while retaining, as much as possible, the original timbral signatures generated by the specified fingerings.

Non-standard fingerings for *chromatic pitches*, for *tempered quartertones and other microtones*, and for *multiphonics* found in ***Cycles of Vega*** are appended within a prefatory table – to aid the clarinetist in checking their intonational accuracy, to assist in the familiarization process, and for general practice purposes.



## MULTIPHONICS

The notation of  $e\flat$  clarinet multiphonics in **Cycles of Vega** is necessarily incomplete: sidebands, such as ‘difference tones’, have been excluded. Nonetheless, the pitches of the highest and lowest component tones (the primary audible pitches) are carefully notated, and should therefore be fairly accurate in performance; this can be ascertained by playing through the abovementioned table. If, however, any *infinitesimal* pitch-discrepancies do occur in playing these multiphonics on your instrument, then they can be ignored!

The *steadiness* of (unstable)  $e\flat$  clarinet multiphonics is not a high priority: unless otherwise indicated, a reasonable degree of ‘inner fluctuation’ is acceptable. Similarly, it is my intention that certain *slow-speaking* multiphonics might be heard only incipiently, whenever their specified durations are insufficient to fully secure and stabilize all of their constituent pitches simultaneously.

## VIBRATO

If used at all when not specifically called for, vibrato on the  $e\flat$  clarinet should be employed with considerable discretion throughout **Cycles of Vega**. Air-column vibrato (generated by pulmonic action), or perhaps even jaw-vibrato, is recommended; unspecified key-vibrato is, however, forbidden!

The following vibrato-types are called for at specific points in the music:

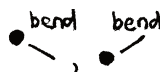


denotes a *key-vibrato*. Its fingering and trilling-action is specified by the tablature pictograph above the staff. The triangular waveform contour suggests micro-details of the key-vibrato's frequency, which may be static or evolving. The emphasis here is upon *timbral* oscillation – although some small microtonal fluctuations may be evident as well. All  $e\flat$  clarinet key-vibrati employed in **Cycles of Vega** have been appended within a prefatory table, the rationale for selecting each key-vibrato's fingering being that it achieves maximal timbral alteration with a minimal pitch-shift, wherever possible.



denotes a *jaw-vibrato*. Repeatedly inflect the given note's pitch with the embouchure and/or through oral-cavity manipulations. The sinusoidal waveform contour suggests micro-details of the jaw-vibrato's frequency and amplitude (i.e. the extent of pitch-alteration around the given note), either of which may be static or evolving. Precise details concerning the (maximum) width of pitch-inflection are left to the discretion of the clarinettist.

## PITCH-BENDS AND PITCH-INFLECTIONS



denote downward and upward *pitch-bends*, respectively – they are executed with the embouchure and/or through oral-cavity manipulations. (Ameliorative changes of fingering-configuration during a pitch-bend are permissible, so long as the pitch-bend itself sounds perfectly smooth.) Pitch-bends should always be carried out towards the end of the indicated duration; moreover, the termination of the ‘bent’ tone must never be emphasized. Soft (*diminuendo*) downward

pitch-bends are to be reminiscent of a sigh, as if the clarinettist is running out of breath! Precise details concerning the range of the pitch-bend are left to the discretion of the clarinettist.



In exactly the same manner as above (including permissible changes of fingering-configuration), bend the tone upwards as far as possible, smoothly.

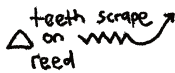


denotes a '*fall-off*' – a pitch-bend falling downwards as far as possible or practicable, using finger-action as well as embouchure and/or oral-cavity manipulations. Allow the tone to break down and smear into lower registers as well!



denote downward and upward *pitch-inflections*, respectively. These are equivalent to their pitch-bend counterparts – except that the pitch promptly returns to the initial given pitch, as shown. The timing of the pitch-inflection within the note's overall duration is clearly indicated on each occasion.

### TEETH-ON-REED



By placing your lower teeth directly upon the  $e\flat$  clarinet's reed, project a thin, piercing, rather unstable but extremely high-pitched (indeterminate) sound; include changes in embouchure-pressure as well. Then scrape your lower teeth up and down over the reed's surface, to create a rough 'broken portamento' effect, including random changes of partial. End the event on as high a pitch as possible, as shown. (Note that such sound-production activities evolve independently of fingering considerations.)

### ARTICULATION





The following special articulations for the  $e\flat$  clarinet are utilized in **Cycles of Vega**:






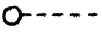
denotes *fluttertonguing*, a trilling of the tongue-tip against the alveolar ridge, or alternatively, a trilling of the back of the tongue against the uvula (soft palate) – as in gargling. Either type of fluttertonguing is acceptable within **Cycles of Vega**: the type, intensity, and speed of the fluttertonguing to be employed at each occurrence are left to the discretion of the clarinettist.




denotes a *slaptongue*. Place a large portion of your tongue against the reed, thereby creating a vacuum between the surface of your tongue and the reed. Suddenly 'break' this vacuum by pulling your tongue down away from the reed – this is often accompanied by a drop in jaw-pressure – whilst simultaneously initiating the air-stream. Such actions on an  $e\flat$  clarinet should result in a very strong, almost percussive attack to a normally-blown note: this instrument's reed is simply too small to generate the characteristic 'thud' of a larger reed noisily rebounding against the mouthpiece, as in a bass clarinet slaptongue. The clarinettist should vary the slaptongue's intensity in accordance with the indicated dynamic level.

- 
 denotes an *aspirated attack*, with minimal intensity, using the phoneme 'h' (as in "hamster"): the sonority is to be rendered *without any 'tonguing' whatsoever!*
- 
 denotes a *diaphragm thrust*. Attack the note with a sharp jolt or impulse from the diaphragm only; do *not* 'tongue'. Again, the articulatory action here is entirely aspirated and pulmonary – but with the aspiration being suitably intensified and heavily accentuated.
- 
 denotes a rising *pitch-bend (portamento) attack*, executed at the beginning of, or immediately prior to, the indicated duration: the technique needed here is precisely the same as that required to produce a pitch-bend (see above). The pitch-range covered by this smooth, upward 'scoop' into the note is left to the discretion of the clarinetist.
- 
 denotes a (very) brief '*squawk*' attack – involving any (very) high pitch elicited from, or somehow related to, the fingering for the primary note, overblown. This colourful attack can be achieved by momentarily touching your lower teeth against the reed; or perhaps better still, curl your lower lip back behind the reed and behind your upper teeth, and with sufficiently high breath-pressure, then allow your lower lip to be blown forward, bursting explosively into its normal embouchure position, thereby yielding a particularly dramatic, raucous overblown attack. The sound, as I have imagined it while composing **Cycles of Vega**, is merely an inseparable part of the note's attack characteristic, and so ought to resemble the occasional transient squeak/squawk noises of a tenor or baritone saxophone that occur sometimes at a change of register in playing jazz.

#### AIR-SOUNDS

- 
 denotes an *air-sound*, in which the given (first-register) pitch is fingered while air is blown through the e♭ clarinet with a loose embouchure that is insufficient to cause the generation of a normally-produced tone: a breathy tube-resonance with a clearly discernible pitch-centre (corresponding to the fingering's fundamental mode of vibration) ensues. Note that an air-sound's timbral quality may be modified in a quite subtle but continuous manner through fluctuations in breath-pressure, or by varying the embouchure and the shape of the oral cavity: the sensible application of these techniques is left entirely to the discretion of the clarinetist. Whenever the circular notehead is drawn non-specifically beneath the stave (bars 1–35), the air-sound's pitch-bias is indeterminate.
- 
 denotes a normally-produced tone that contains *strong air-coloration* (i.e. 'breathiness').
- 
 denotes a *transition* from a 'pure' tone (containing no air-coloration) to an air-sound.
- 
 denotes a *transition* from an air-sound to a 'pure' tone (containing no air-coloration).

## KEY/FINGER-SOUNDS

 denotes a *key/finger-sound*, in which the e♭ clarinet's key-mechanism is made audible and/or tube-resonances are generated by keys/fingers slapping shut *hard* over their holes, in addition to the blown tone. In trilling actions, an × is drawn above the triangular waveform contour; the finger(s) engaged in the ongoing percussive activity are usually identified with an × in the tablature pictograph. A *transition* to prominent key/finger-sound (*f poss.*) is indicated by ----- × .

Numerous articulations and techniques involving air-sounds generated by blowing air through the instrument with a loose embouchure, as well as key-finger sounds, are also required in *Cycles of Vega*. Further explanation on how these techniques are notated and executed is shown in Ex.3-6.

Shanahan also investigated the application of 'one-handed fingerings' for the e♭ clarinet, since he initially envisaged *Cycles of Vega* to be played by one percussionist and a clarinetist who also plays other percussion instruments simultaneously at specified times. The idea of a woodwind performer playing upon two instruments at once is not a new one. Shanahan was prompted to score *Cycles of Vega* in such a manner after playing a piece written especially for him by the Australian composer Bruce Cale, entitled *Cullenbenbong*. This work is scored for bass recorder and seven Japanese temple bells (*rin*), all being under the control of a single player:

### Ex.3-7. Bruce Cale: *Cullenbenbong*. p.6.

(Bass recorder and 7 Japanese Temple Bells [*Rin*]: 1 player)

[access to *Cullenbenbong*'s score is not possible at present]

The bass recorder's phrase is played entirely with fingerings that utilize the left hand on its own; meanwhile, a hard wooden mallet held in the performer's right hand strikes several *rin* ...<sup>19</sup>

Similarly, in the earliest version of *Cycles of Vega* at bars 4–35, the clarinetist (ideally) is called upon to play the clarinet exclusively with their left hand, leaving the right hand free to strike the windchimes; also in bars 180–214, right-hand fingerings are employed in order to allow the left hand to play the *rin*:

### Ex.3-8. *Cycles of Vega*, bars 180–181 [version for 2 percussionists].

[access to the earliest version of the score is not possible at present]

In the sketches for *Cycles of Vega*, Shanahan devised several charts displaying which 'single-hand resources' were available for the e♭ clarinet. The fingerings for these pitches are included in the preface to his score.

During 1991, Shanahan revised *Cycles of Vega*, scoring it instead for two

separate percussionists, whilst leaving the clarinetist free to perform on the clarinet alone. This was done for pragmatic reasons, namely, the reluctance of most clarinetists to perform a piece where they are required to play both percussion instruments and their clarinet simultaneously. However, in re-scoring *Cycles of Vega*, Shanahan has left the clarinet's pitch-structure untouched.

The use of new sounds and extended techniques in *Cycles of Vega* creates a sound-world which is a definite step forward in creating new sonic styles.

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Endnotes

1. Peterson (1973), p.75.
2. "Chromatic" rhythm: In the work of Messiaen, this term describes a series of note-values in which the notes move progressively to another value that is larger or smaller by one *chronos protos*. For example, with the semiquaver as the *chronos protos*, the following series is 'chromatic':
3. "Interventions" in Messiaen's music are types of rhythmic variations. For example, in the first movement of *Livre d'Orgue*, entitled *Reprises par Intervention*, Messiaen explains his interventions for this movement as repetitions from the ends to the centre, from the centre to the ends, or the retrograde of a given pattern or series of patterns.
4. Numbers enclosed in braces – { } – represent unordered sets of durations, whereas numbers between brackets – [] – denote some permutation, where the ordering is important. Numbers listed within parentheses – () – define cyclic (sub)groups of permutations. In Ex.3-1, permutation I = [3, 5, 2, 1, 4] is obtained from [1, 2, 3, 4, 5]. At each step in successive applications of permutation I to itself, 1 becomes 3 becomes 2 becomes 5 becomes 4 becomes 1, etc. So this group of five distinct permutations is succinctly designated by the cycle (1, 3, 2, 5, 4). (For further information on Cyclic Group Theory, Herstein (1975), pp.75–82 is recommended.)
5. In musical terms, an 'irrational' value is non-binary – one which is not derived by dividing or multiplying a given *tactus* by any power of two. These include all 'tuplets' (i.e. triplets, quintuplets, septuplets, etc.). In the performance notes to his *Dimensiones Paradisi* (1991–1993), for solo alto flute, Shanahan provides the following definition:

$\overbrace{b:c} =$ A group of *b* equal units fills the time of *c* × the indicated basic durational unit; that is, a single unit of the group will be *c/b* (× [multiplied by] the indicated basic durational unit) long.

For example, taking a crotchet as the basic durational unit:

$\overbrace{5:4} =$ A group of five (quintuplet) crotchets fills the time of four standard crotchets; that is, a single crotchet of the group will be 4/5 of a standard crotchet in duration.

6. Shanahan (October 1985), p.2.
7. Samuel (1976), p.33.

8. Machlis (1963), p.624.
9. Shanahan ("Sounds Unlimited", 1988), p.12.
10. Shanahan (April 1993), p.1.
11. Shanahan (April 1993), p.18, en.3:

In view of current musical aesthetics, one may arrive at a workable definition of 'noise' as being those sounds which have such a high level of aural complexity and transient phenomena that individual frequencies within the sound can no longer be readily perceived or determined.
12. Shanahan (December 1992), p.1.
13. *ibid.*
14. Shanahan (Preface to *Cycles of Vega*, 1991).
15. *ibid.*
16. Shanahan (April 1993), p.3.
17. Shanahan (Interview, September 1993).
18. Shanahan (Preface to *Cycles of Vega*, 1991).
19. Shanahan (April 1993), p.169.

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## 4. AN ANALYSIS OF CYCLES OF VEGA

### 4.1 Introductory Remarks

Ian Shanahan composed *Cycles of Vega*, for  $\text{e}\flat$  clarinet and percussion instruments, between 1988 and 1991. In his programme annotation, Shanahan states that *Cycles of Vega* is intended to be a companion piece to a work that he composed in 1984 entitled *Echoes/Fantasies*, for bass clarinet, vibraphone(s) and tubular bells. He explains that these compositions are allied through the use of “related musical materials and structure”.<sup>1</sup> The use of permutations in devising temporal details and long-range cyclical structures is also common to both works.

As was discussed in chapter two, the title *Cycles of Vega* stems from Shanahan’s long-standing interests in Astronomy, Astrophysics, Cosmology and the Cosmos itself. Vega is the brightest star in the musically named constellation Lyra. Cycles based on treatment of rhythm, timbre and pitch form the structural basis of the work. Shanahan relates these musical cycles to the astronomical term ‘precession’, which describes the rotational process of celestial bodies about their axis. In addition, he suggests that the cycles within *Cycles of Vega* provide a metaphorical mirror for many cyclical processes in nature.<sup>2</sup>

An important characteristic of *Cycles of Vega* is the organization of its temporal dimension. The macrostructure of the piece is founded essentially upon a system of permutations. The work falls into three main sections, or cycles, based upon a rhythmic pattern, and each main cycle itself contains smaller cycles within them: epicycles. The sections are related, in that they each use as their rhythmic basis material from the permutations. But in each cycle, the material is used differently, with other counterpoints and rhythms being introduced into the clarinet part, together with other timbres, pitches and harmonies or chord-colours (sound-entities).

A listener is unlikely to consciously register all of the various layers of cycles within the piece. Indeed, Shanahan does not expect every one of them to be discerned. However, for the global effect to be appreciated, these cyclical strata do need to be present. Furthermore, the composer declares that:

... the intricate structural hierarchies within *Cycles of Vega* could perhaps be interpreted as an (admittedly gross) simplification, essence, or symbol of the infinite architectonic nature of God’s Universe.<sup>3</sup>

As already stated, the sound-world of *Cycles of Vega* is made unique through Shanahan’s idiosyncratic choice of instrumentation, including a substantial array of windchimes and metallic percussion instruments, some of which were made by the composer himself. Further links with science and the Universe are made by Shanahan’s suggestion that these instruments physically exemplify Chaos Theory through their random acoustical behaviour.<sup>4</sup>

## 4.2 Temporal Aspects

*Cycles of Vega* falls into three main sections. After a brief introduction, section one extends from bars 4–35; it is followed by a short linking passage (bars 36–39). The second section incorporates bars 40–177, and forms the main section of the work. Another bridge passage (bars 178–179) leads into bars 180–214, which encompass the final section. A brief coda (bars 215–218) ends the piece.

The foreground structure of *Cycles of Vega* is built upon a system of permutations of twenty-nine pre-composed durations which use the semiquaver as the *chronos protos*. (This permutation system was described in 3.1.) The twenty-nine durations were partitioned into seven smaller subgroups and permuted amongst themselves, resulting in twenty-nine subpermutations (Ex.3-4). The composer then calculated the total length in *chronos protoi* of each of the seven subgroups (Ex.4-1), in preparation for the next compositional step, wherein various subpermutations would be combined to form the long-range rhythmic cycles of each main section.

### Ex.4-1. Table of seven subgroups used in the system of permutations.

$$\xi_1 = (1, 2, 20, 19) = (4 \text{ ♩}, 6 \text{ ♩}, 5 \text{ ♩}, 2 \text{ ♩})$$

$$\xi_2 = (9) = (1 \text{ ♩})$$

$$\xi_3 = (5, 29) = (8 \text{ ♩}, 9 \text{ ♩})$$

$$\xi_4 = (6, 7, 27, 25, 8, 28, 26) = (3 \text{ ♩}, 2 \text{ ♩}, 11 \text{ ♩}, 10 \text{ ♩}, 12 \text{ ♩}, 14 \text{ ♩}, 7 \text{ ♩})$$

$$\xi_5 = (3, 21, 23, 13, 24, 14, 4, 22) = (1.333 \text{ ♩}, 2 \text{ ♩}, 2.667 \text{ ♩}, 2 \text{ ♩}, 18.333 \text{ ♩}, 7 \text{ ♩}, 5.667 \text{ ♩}, 3 \text{ ♩})$$

$$\xi_6 = (10, 12, 11) = (3.2 \text{ ♩}, 6.4 \text{ ♩}, 20.4 \text{ ♩})$$

$$\xi_7 = (15, 18, 17, 16) = (4.571 \text{ ♩}, 3.429 \text{ ♩}, 12.857 \text{ ♩}, 1.143 \text{ ♩})$$

The percussion part is created almost entirely from these pre-composed rhythms. However, the clarinet part instead makes use of other compositional resources and techniques, much of it being freely composed or borrowing material from *Echoes/Fantasies*, the companion piece to *Cycles of Vega*.

### 4.2.1 Section One (bars 4–35)

#### *Rhythmic Construction*

Section one of *Cycles of Vega* is exactly 120 quaver beats in length. The percussion part comprises four repetitions of a rhythmic pattern or cycle of 30 quavers in duration. The clarinet part, also, is formulated on cyclical principles: each rhythmic cycle of the clarinet part is 24 quavers in length and must, therefore, repeat five times in order to fit within the total length of section one.



Both the clarinet and percussion parts proceed concurrently through their individual isorhythmic cycles, coordinating in phase only on the first and last semiquaver beats of section one. The temporal macrostructure of section one, therefore, functions like a long-range 5:4 rhythmic pattern. This concept is illustrated in Ex.4-2:

**Ex.4-2. 5:4 pattern of rhythmic cycles in *Cycles of Vega*, bars 4–35.**

Clarinet: [5 ♩ + 7 ♩ + 5 ♩ + 4 ♩ + 4 ♩ + 4 ♩ + 5 ♩ + 2 ♩] ×4

Percussion: [5 ♩ + 7 ♩ + 5 ♩ + 4 ♩ + 4 ♩ + 4 ♩ + 1 ♩] ×5

*Percussion*

The temporal structure of the percussion part in section one springs purely from the rhythmic material obtained from the permutations of the seven subgroups discussed in 3.1. None of these subpermutations is precisely 30 quaver beats in length, unlike each cycle in the percussion part of section one. Therefore, the composer selected subpermutations of diverse lengths and then interleaved them in such a way as to make their total duration equal to 30 quavers. Four combinations were decided upon, as shown in Ex.4-3:

**Ex.4-3. Table of subpermutations in the percussion part, bars 4–35.**

| Section One<br>(percussion) | Layer | 'Subpermutations'                     | Spans                           |
|-----------------------------|-------|---------------------------------------|---------------------------------|
|                             | I     | $R_2 \cup (\xi_4)^5$                  | 1 ♩ + 59 ♩ = 60 ♩ = 30 ♩        |
|                             | II    | $(\xi_1)^2 \cup (\xi_5)^6 \cup R_2^*$ | 17 ♩ + 42 ♩ + 1 ♩ = 60 ♩ = 30 ♩ |
|                             | III   | $R_3 \cup (\xi_5)^4 \cup R_2^\dagger$ | 17 ♩ + 42 ♩ + 1 ♩ = 60 ♩ = 30 ♩ |
|                             | IV    | $R_6 \cup \xi_6$                      | 30 ♩ + 30 ♩ = 60 ♩ = 30 ♩       |

\* Within layer II here,  $R_2 = [9]$  was inserted after duration 21 from  $(\xi_5)^6$ .

† Within layer III here,  $R_2 = [9]$  was inserted after duration 29 from  $R_3$ .

The subpermutations were not, however, simply joined together in succession: they were deployed in a special way, according to a set rule. This rule states that R (i.e. the original rhythm of twenty-nine pre-composed durations) itself determines where the permutations are inserted into one another. To illustrate how this rule is applied, layer II is used as an example in Ex.4-4:

**Ex.4-4. The procedure for interspersing subpermutations.**

Rule: R (the original ordering of twenty-nine durations), and its unpermuted 'subrhythms'  $R_1$  to  $R_7$ , determine how the subpermutations are to be spliced into one another. For example:

Layer II of Ex.4-3 =  $\Theta^2(R_1) + \Theta^6(R_5) + R_2$ .

$\Theta^2(R_1) = [20, 19; 2, 1]$ .

$R_1 = [1, 2; 19, 20]$ .

$\Theta^6(R_5) = [4, 24; 21, 13; 22, 14, 3, 23]$ .

$R_5 = [3, 4; 13, 14; 21, 22, 23, 24]$ .

$R_2 = [9]$ .

In his sketches, Shanahan calls the single *chronos protos*  $R_2$  a “wanderer”, alluding to astronomical wanderers such as comets. It may be placed freely, then, wherever the composer chooses, among the other subpermutations.

$\Theta^2(R_1)$

$\Theta^6(R_5)$

$R_2$

Layer II: [20, 19; 4, 24; 21, 9, 13; 2, 1; 22, 14, 3, 23].

$R_1 + R_2 + R_5$ : [1, 2; 3, 4; 13, 9, 14; 19, 20; 21, 22, 23, 24].

Four combinations of subpermutations were selected, because the percussion part accommodates four superimposed rhythmic layers, which are then marshalled together under a single system of barlines (Ex.4-5). The numbers corresponding to each separate duration are placed underneath in order to show how the subpermutations fit together. Ex.4-5 presents only one cycle of 30 quavers; this would be repeated four times. The beginning of each cycle is marked by a very distinctive, aggressive rasping sonority, which is created by sweeping the ball of the vibraslap across the resonator tubes of the vibraphone.<sup>5</sup> This violent glissando effect is notated with an x-notehead (bars 4, 12, 20, 28). Each cycle also ends with the herd bell windchime:

**Ex.4-5. The four superimposed rhythmic layers in the percussion part, bars 4–35.**

[omitted]

*Clarinet*

The rhythmic cycle underpinning the clarinet part in section one is not derived from the abovementioned system of permutations. A new rhythmic pattern was pre-composed, being 48 semiquavers (24 quavers) in length. This was then subdivided into 17 + 20 + 11 semiquavers – for pitch-related reasons, as discussed later in 4.5.1 – and repeated five times. The rhythmic pattern is shown in Ex.4-6:

#### **Ex.4-6. Rhythmic cycle in the clarinet part, bars 4–35.**

See the clarinet part, bars 4–10 (1st ♪).

A distinctive multiphonic trill-portamento marks the beginning of each of the clarinet's 24-♪ cycles (bars 4, 10, 16, 23, 29).

#### **4.2.2 Section Two (bars 40–177)**

##### *Rhythmic Construction*

Section two is the central and largest section of *Cycles of Vega*. The main cycle of this section is much longer than those of sections one and three, extending over a total of 46 bars. This cycle is repeated three times. The first cycle commences at bar 40, the second at bar 86, and the third at bar 132.

##### *Percussion*

The percussion part in this section encompasses two superimposed rhythmic layers. One layer uses the original rhythm,  $R$ , of twenty-nine pre-composed durations, whilst  $R$ 's first permutation,  $\Theta(R)$ , forms the second layer. These two layers form the basis of the main cycle within section two, each cycle totalling 188 semiquavers (94 quavers) in length. The end of each cycle is marked by a stroke of the tam-tam (bars 85, 131, 177).

##### *Clarinet*

In section two, the clarinet part's temporal design is freely composed, having no relation to the pre-composed set of durations. Nonetheless, the clarinet's rhythmic material still falls into three subsections (A, B, C), each corresponding in length to the cycles of the percussion part. The rhythms in subsections A and B have little relation to one another; however, those of subsection C are accretions of the rhythms in subsections A and B. (This evolutionary process is also applied to the clarinet pitches utilized in subsections A, B and C, and so shall be discussed in more detail in 4.5.1, where an example will be provided [Ex.4-17].)

#### **4.2.3 Section Three (bars 180–214)**

##### *Rhythmic Construction*

The structural hierarchies within section three involve several cycles. The

main percussion cycle is 22 quaver beats in length, and is played through three times. A different cycle is played by the *rin* alone, following a varied pattern of  $17 \times 3 + 16$  quavers.

### Percussion

Shanahan again draws upon the group of permutations in this section. Applying the same rules for interleaving the subpermutations as was employed in section one, three new durational patterns were obtained: each pattern is 132 semiquavers (66 quavers) in length. The combination of subpermutations used is shown in Ex.4-7:

#### Ex.4-7. Table of subpermutations in the percussion part, bars 180–214.

##### Section Three (percussion)

| Layer | 'Subpermutations'                                        | Spans                                                                                  |
|-------|----------------------------------------------------------|----------------------------------------------------------------------------------------|
| I     | $((\xi_7)^3 \cup (\xi_7)^2) \times 3$                    | $(22 \text{ ♩} + 22 \text{ ♩}) \times 3 = 132 \text{ ♩} = 66 \text{ ♩}$                |
| II    | $((\xi_5)^2 \cup R_2 \cup R_2) \times 3^*$               | $(42 \text{ ♩} + 1 \text{ ♩} + 1 \text{ ♩}) \times 3 = 132 \text{ ♩} = 66 \text{ ♩}$   |
| III   | $((\xi_1)^3 \cup \xi_3) \times 3 \cup (\xi_6)^2 \dagger$ | $(17 \text{ ♩} + 17 \text{ ♩}) \times 3 + 30 \text{ ♩} = 132 \text{ ♩} = 66 \text{ ♩}$ |

\* Within layer II here,  $R_2 = [9]$  – i.e. the 'wandering' *chronos protos* – is twice inserted into  $(\xi_5)^2$  thus: [..., 22, 9, 13, 9, 21, ...].

† During the third cycle of the isorhythm  $(\xi_1)^3 \cup \xi_3$ , durations 1 and 29 were each adjusted by 1 ♩ – in order to sidestep a literally repetitious, simplistic rhythm which would otherwise have occurred locally. Layer III is assigned to the *rin* alone.

As in the previous sections, these three rhythmic patterns are stratified and notated with bar lines. The third stratum of subpermutations in Ex.4-7 (Layer III) is assigned to the *rin*. The metrication of these three layers is shown in Ex.4-8. The individual durations are marked so that the pattern of interleaving of subpermutations can be clearly identified:

#### Ex.4-8. The three superimposed rhythmic layers in the percussion part, bars 180–214.

[omitted]

A complete interruption to the unfolding cyclical process, marked by a soft stroke upon the sizzle cymbal, occurs at bar 208 (Ex.4-9). Shanahan states that:

This intercut is meant to come as a total surprise, giving the impression of 'time standing still', yet thwarting the listener's obvious expectation that the 'clockwork mechanism' will just wind down inexorably, unimpeded.<sup>6</sup>

The graphic verbal description included in the score aptly expresses the composer's intentions:

An (uncoordinated) interruption in the process, like a brilliant, blinding, coruscative wave of light!

In bar 209, the cyclic processes resume, as before, signalled again by the sizzle cymbal (which, to make the incursion even more distinctive, is not heard anywhere else within this section).

#### Ex.4-9. *Cycles of Vega*, bars 207–209.

An (uncoordinated) interruption in the process, like a brilliant, blinding, coruscative wave of light!

... = 43...

trilling-action:

Rand.

"suspended time"

teeth scrape on reed extremely piercing

c. 2" Rand.

c. 5" DO NOT MOVE!

2 16 28

bend

ppoco

mf

ff

poss.

★ chaotic! - but one smooth gesture.

★★ immediately cut off the sound by suddenly removing the clarinet's mouthpiece from between the lips!

ppp

pp

Sizz

P

mf

sffz!

c. 7" DO NOT MOVE!

6 1 5

c. 7" DO NOT MOVE!

mf sffz: f

(continuing on...)

..

209

e<sup>b</sup> Clar.

2  
8

mp: ppp

(pp)

★ grace-note: "on the beat".  
★★ as in bars 180-181.

PERC. 1

Coil

Tri

15

Crot

Vib

Sizz

Ped

Cym

ppp

PERC. 2

Rin

### Clarinet

As in section two, the clarinet part is freely composed with no relation to the pre-composed durations obtained through the permutation process.

### 4.2.4 Additional Features affecting Duration

An important technique which Shanahan uses in *Cycles of Vega* is to allow the duration of certain events to be governed entirely by the resonance properties of the instruments themselves. This procedure is adopted primarily within the linking passages and coda. The first instance occurs in bars 37-39, where the tam-tam is struck with a large, (very) soft felt mallet, and the dynamic is marked

*“f”*. In the score at this point, the composer instructs the players to “Pause until the tam-tam resonance is ‘mp’ (approx.)”. A series of free durations then follows, marked by a forceful attack upon the chinese cymbal marked *“sfffz!”*. The cymbal must be damped “by grasping strongly with the right hand immediately after striking”. The composer uses large bold arrows as cues in bar 39, in order to indicate how the sonic events are to trigger one another. His instruction in the score states:

Free durations. One smooth gesture: react to one another in accordance with the given arrows; well-connected, continuous.

During these “free durations”, the tam-tam is still resonating. The players must again “pause until the tam-tam resonance is ‘pp’”:

#### Ex.4-10. *Cycles of Vega*, bar 39.

FREE DURATIONS One smooth gesture: react to one another in accordance with the given arrows; well-connected, continuous...

Pause until the Tam-Tam resonance is 'pp'

Ch teeth on reed

brilliant: a.f.a.p.

pp mp ff!

\* A rather short indeterminate duration - like an after-resonance. Play immediately upon hearing the Ch attack (bar 38). Teeth-on-reed: very high and steady initially, starting pure and dissonant.

Vib gliss, KBT

Vib, KBT

Vib, Cowb

brilliant but dry: a.f.a.p.

fast, raspy.

non Ped. (throughout bar 39)

P

sfffz

f poss.

Cowb 2

Cowb 3

sfffz

Clar. mordent

\*\* coordinate precisely with Clar.

Clar. reed-scrape

KBT

mf

simultaneously with Vib gliss. (Perc. 1).

= 65.

Cowb 2

Sleight

Place Dove between lips: unopen (as much as possible).

pp

39

The second linking passage begins at bar 178. The preceding bars have been building towards a climax in the dynamic and tension levels of the piece with all parts being marked *“f poss.”*. The Shan Tubes are collided together at this point, and the composer desires the sound to be “cataclysmic!”. There is then a directive in the score at bar 179 to “Pause until the overall dynamic of the percussion resonances is ‘mf’ (approx.)”. The composer estimates this decay to take about 11 seconds.

Finally, in the work's coda, two further examples of resonance-determined durations can be found. At bar 215, the players must again wait until the "... tam-tam resonance is 'ppp' (approx.)". The last instruction in the piece states:

Maintain your physical attitude for approximately 10 seconds: do not move until any other resonances are lost in the distance ... Now relax!

(In performance, such an action serves a theatrical as much as an acoustical purpose: in particular, the special ambience of the piece is to be preserved for as long as possible, prior to being shattered by audience response at the point where the players signal the piece's conclusion through relaxing.)

As a result of the above techniques, certain temporal facets of *Cycles of Vega* are indeterminate, relying solely upon the resonant acoustical properties of the instruments and performance space.

#### 4.3 Tension Levels: Dynamic- and Tempo-Glissandi

Cyclical structures, such as those found in *Cycles of Vega*, tend to be anti-teleological, not goal-directed. By their very nature, they imply no inherent direction towards a final repose; rather, they move through musical material and time in unbroken circles. Consequently, Shanahan used dynamics and tempo-glissandi to impose any tension relationships and goal-direction upon the macrostructure of the piece.

Long-range tempo-glissandi are, therefore, an important feature of *Cycles of Vega*. In his "Notes for the Performers" at the front of the score, Shanahan writes:

**Cycles of Vega** embraces extremely subtle, long-range *accelerandi* and *decelerandi* (bars 12–36; bars 86–178; and bars 180–214), the contours of which are defined by approximate tempo-indications every bar or so. In order that performers attain the required shapes of these tempo-contours fairly accurately, they are advised to repeatedly 'count through' the piece with an *electronic metronome*, turning the device's dial correspondingly. This practice activity will greatly assist projecting, in concert, the right 'feel' of tempo-evolution. Of course, a certain degree of flexibility is permissible, provided that the general contours of tempi are preserved overall. Additionally, approximate durations (in minutes and seconds) of subsections of **Cycles of Vega** have been supplied, both singly and cumulatively, as an aid to executants in this respect.<sup>7</sup>

Due to their long range, these tempo-glissandi exert an extremely subtle force upon the piece, to the extent that their initial increase or decrease is virtually imperceptible. Shanahan utilized a complicated mathematical formula to calculate the shift of tempo against the number of beats elapsed. His general formula, shown below, was adapted accordingly to yield the three different tempo-glissandi used in *Cycles of Vega*. It also possesses the interesting property, claims the composer, of having a contour that approximates equal temperament in the tempo-domain:



# **Ex.4-11. Generalized mathematical formula for tempo-glissandi.**

$$T = T(b) = ((T_0)^{r^{-1}} + ((T_B)^{r^{-1}} - (T_0)^{r^{-1}}) \times b \div B)^r$$

where  $r$  = any real number.  
(This variable modulates the contour of the tempo-glissando.)

$b$  = the number of beats elapsed.

$B$  = the total number of beats over which the tempo-glissando takes place.

$T$  = the tempo at  $b$ .

$T_0$  = the initial tempo of the tempo-glissando.

$T_B$  = the final tempo of the tempo-glissando.

Example: tempo-glissando, bars 86–178.

$B = 188$ ;  $T_0 = 43$ ;  $T_B = 134$ . Erroneous interpolated tempi have been underlined.

Tempo-glissando formula:  $T = T(b) = (43^{-0.75^{-1}} + (134^{-0.75^{-1}} - 43^{-0.75^{-1}}) \times b \div 188)^{-0.75}$ .

$d = (134^{(-0.75^{-1} - 1)} - 43^{(-0.75^{-1} - 1)}) \times 188 \div (1.75 \times (134^{-0.75^{-1}} - 43^{-0.75^{-1}}))$   
 $\approx 2.976023433$  minutes  $\approx 178.56$  seconds.

| <b>b</b> | <b>Tempo</b>             | <b>Ideal</b>     | <b>b</b> | <b>Tempo</b>             | <b>Ideal</b>     | <b>b</b> | <b>Tempo</b>             | <b>Ideal</b>      |
|----------|--------------------------|------------------|----------|--------------------------|------------------|----------|--------------------------|-------------------|
| 0 ♪      | ♪ = <i>ca.</i> 43        | 43.00            | 99 ♪     | ♪ = <i>ca.</i> 64        | <i>ca.</i> 63.95 | 147.5 ♪  | ♪ = <i>ca.</i> 88        | <i>ca.</i> 87.50  |
| 5 ♪      | ♪ = <i>ca.</i> 44        | <i>ca.</i> 43.68 | 103 ♪    | ♪ = <i>ca.</i> 65        | <i>ca.</i> 65.33 | 149.5 ♪  | ♪ = <i>ca.</i> 89        | <i>ca.</i> 88.93  |
| 13 ♪     | ♪ = <i>ca.</i> 45        | <i>ca.</i> 44.83 | 105 ♪    | ♪ = <i>ca.</i> 66        | <i>ca.</i> 66.05 | 151.5 ♪  | ♪ = <i>ca.</i> 90        | <i>ca.</i> 90.42  |
| 21.5 ♪   | ♪ = <i>ca.</i> 46        | <i>ca.</i> 46.12 | 107 ♪    | ♪ = <i>ca.</i> 67        | <i>ca.</i> 66.79 | 153.5 ♪  | ♪ = <i>ca.</i> 92        | <i>ca.</i> 91.97  |
| 26.5 ♪   | ♪ = <i>ca.</i> 47        | <i>ca.</i> 46.93 | 111 ♪    | ♪ = <i>ca.</i> 68        | <i>ca.</i> 68.32 | 155.5 ♪  | ♪ = <i>ca.</i> 94        | <i>ca.</i> 93.58  |
| 30.5 ♪   | ♪ = <i>ca.</i> 48        | <i>ca.</i> 47.59 | 113 ♪    | ♪ = <i>ca.</i> 69        | <i>ca.</i> 69.13 | 157.5 ♪  | ♪ = <i>ca.</i> <u>96</u> | <i>ca.</i> 95.26  |
| 38.5 ♪   | ♪ = <i>ca.</i> 49        | <i>ca.</i> 49.00 | 115.5 ♪  | ♪ = <i>ca.</i> 70        | <i>ca.</i> 70.16 | 159.5 ♪  | ♪ = <i>ca.</i> 97        | <i>ca.</i> 97.01  |
| 45 ♪     | ♪ = <i>ca.</i> 50        | <i>ca.</i> 50.21 | 118.5 ♪  | ♪ = <i>ca.</i> 71        | <i>ca.</i> 71.44 | 161.5 ♪  | ♪ = <i>ca.</i> 99        | <i>ca.</i> 98.83  |
| 50 ♪     | ♪ = <i>ca.</i> 51        | <i>ca.</i> 51.20 | 120.5 ♪  | ♪ = <i>ca.</i> 72        | <i>ca.</i> 72.33 | 163.5 ♪  | ♪ = <i>ca.</i> 101       | <i>ca.</i> 100.74 |
| 53.5 ♪   | ♪ = <i>ca.</i> 52        | <i>ca.</i> 51.91 | 122.5 ♪  | ♪ = <i>ca.</i> 73        | <i>ca.</i> 73.25 | 165.5 ♪  | ♪ = <i>ca.</i> 103       | <i>ca.</i> 102.74 |
| 57.5 ♪   | ♪ = <i>ca.</i> 53        | <i>ca.</i> 52.76 | 124.5 ♪  | ♪ = <i>ca.</i> 74        | <i>ca.</i> 74.19 | 167.5 ♪  | ♪ = <i>ca.</i> 105       | <i>ca.</i> 104.83 |
| 61.5 ♪   | ♪ = <i>ca.</i> 54        | <i>ca.</i> 53.64 | 126.5 ♪  | ♪ = <i>ca.</i> 75        | <i>ca.</i> 75.16 | 169.5 ♪  | ♪ = <i>ca.</i> 107       | <i>ca.</i> 107.02 |
| 65.5 ♪   | ♪ = <i>ca.</i> 55        | <i>ca.</i> 54.55 | 128.5 ♪  | ♪ = <i>ca.</i> 76        | <i>ca.</i> 76.16 | 171.5 ♪  | ♪ = <i>ca.</i> 109       | <i>ca.</i> 109.33 |
| 69.5 ♪   | ♪ = <i>ca.</i> 56        | <i>ca.</i> 55.50 | 130.5 ♪  | ♪ = <i>ca.</i> 77        | <i>ca.</i> 77.19 | 173.5 ♪  | ♪ = <i>ca.</i> 112       | <i>ca.</i> 111.75 |
| 77.5 ♪   | ♪ = <i>ca.</i> <u>57</u> | <i>ca.</i> 57.53 | 132.5 ♪  | ♪ = <i>ca.</i> 78        | <i>ca.</i> 78.26 | 175.5 ♪  | ♪ = <i>ca.</i> 114       | <i>ca.</i> 114.30 |
| 81.5 ♪   | ♪ = <i>ca.</i> <u>58</u> | <i>ca.</i> 58.61 | 135 ♪    | ♪ = <i>ca.</i> 80        | <i>ca.</i> 79.64 | 177.5 ♪  | ♪ = <i>ca.</i> 117       | <i>ca.</i> 116.99 |
| 83.5 ♪   | ♪ = <i>ca.</i> 59        | <i>ca.</i> 59.17 | 137 ♪    | ♪ = <i>ca.</i> 81        | <i>ca.</i> 80.78 | 179.5 ♪  | ♪ = <i>ca.</i> 120       | <i>ca.</i> 119.84 |
| 85.5 ♪   | ♪ = <i>ca.</i> 60        | <i>ca.</i> 59.74 | 139 ♪    | ♪ = <i>ca.</i> 82        | <i>ca.</i> 81.97 | 181.5 ♪  | ♪ = <i>ca.</i> 123       | <i>ca.</i> 122.85 |
| 89.5 ♪   | ♪ = <i>ca.</i> 61        | <i>ca.</i> 60.92 | 141 ♪    | ♪ = <i>ca.</i> 83        | <i>ca.</i> 83.20 | 183.5 ♪  | ♪ = <i>ca.</i> 126       | <i>ca.</i> 126.05 |
| 94 ♪     | ♪ = <i>ca.</i> 62        | <i>ca.</i> 62.31 | 144 ♪    | ♪ = <i>ca.</i> 85        | <i>ca.</i> 85.12 | 184 ♪    | ♪ = <i>ca.</i> 127       | <i>ca.</i> 126.87 |
| 97 ♪     | ♪ = <i>ca.</i> 63        | <i>ca.</i> 63.28 | 146 ♪    | ♪ = <i>ca.</i> <u>87</u> | <i>ca.</i> 86.46 | 188 ♪    | ♪ = <i>ca.</i> 134       | 134.00            |

$r = -4/3$ ;  $B = 188$ ;  $T_0 = 43$  beats-per-minute;  $T_B = 134$  beats-per-minute.

Shanahan reinforces the tension gradients created by the tempo-glissandi through a careful deployment of dynamics: there is a clear correlation between the dynamic levels and the metronome markings. A long-range diminuendo corresponds with the gradual slowing of tempo between bars 12 and 36. During the first cycle in section two (bars 40–85), where the tempo remains steady at quaver = 43, a low dynamic level prevails, rarely rising above ‘*p*’. Between bars 86 and 178, the dynamic level rises progressively in intensity – supporting the accelerando – which peaks at the end of section two (bars 175–177), where the tension is extreme and the dynamics are now at the loudest end of the scale, being marked “*f poss.*”. The clarinet figurations add significantly to the sense of excitement, including rapid grace notes, trills, fluttertonguing, and finally, a screaming altissimo *b♭* with key vibrato. This passage is accompanied by evocative verbal directives such as “brilliant and starry” and “cataclysmic!”. Similarly, a long-range diminuendo conforms to the final decelerando in bars 180–214, ending the piece with a dynamic of “*p poss.*”.

The tension structure of *Cycles of Vega* can be illustrated by the curve shown below:

**Ex.4-12. The tension contour of *Cycles of Vega*, as represented by dynamic- and tempo-glissandi.**

[omitted]

Fluctuating vibrato-speeds in the vibraphone part further influence the tension levels within *Cycles of Vega* – although it is likely that this subtle device functions in that capacity at only a subliminal level. Continuously variable rates of vibrato are achieved through using a vibraphone equipped with its usual apparatus of an electric motor controlled by a potentiometer, the percussionist turning the knob of the potentiometer accordingly with their right hand. Changes in vibrato-rates are indicated in the score; an explanation of how these changes should be carried out is found within the preface to the score:

**Ex.4-13. *Cycles of Vega*, Notes for the Performers: “Percussion: details”.**

**Vibraphone: Vib**

*Range: F#2 — F#5. A high-quality modern instrument (with wide bars in the low register) is required. The vibraphone must also be equipped with an electric motor and potentiometer that will yield a continuously variable speed of vibrato – widely ranging from ‘slow’ to ‘fast’; an instantaneous vibrato on/off capability, activated by a switch and/or by the potentiometer, is needed as well. Indeed, the vibraphone’s vibrato must be able to be turned on or off with the potentiometer alone: for instance, this faculty is crucial for the initial vibrato accelerando, in bar 44.*

**Vibraphone Vibrato:** Rates of vibrato on the vibraphone are specified by ringed numbers: ① indicates non-vibrato (i.e. ‘motor off’); ⑥ signifies the vibraphone’s maximum vibrato-frequency; ① and ② ≈ ‘slow’ vibrati; ③ and ④ ≈ ‘medium’ vibrati; and ⑤ ≈ a ‘fast’

*vibrato. Between the extremes of ⑩ and ⑥, the numbers ①, ②, ③, ④, and ⑤ denote approximately equal gradations of vibrato-rate; hence, each of these numbers is perhaps best thought of as a narrow bandwidth of vibrato-frequencies, so that ③ (for example) does not designate a precise, fixed rate of vibrato for each of its occurrences. When the vibraphone's motor is turned off (i.e. to ⑩: non-vibrato), do please remember also to rotate the vibrato-discs at the top of the instrument's resonators to their vertical position – in order to capture the vibraphone's maximum degree of sonorousness. Smooth transitions between numbered rates of vibrato (i.e. vibrato accelerandi or vibrato rallentandi) are depicted by appropriately sloping dashed lines which connect the ring around one vibrato number to that around the next. NB: It is most probably advantageous to employ an assistant whose sole purpose will be to manipulate the vibraphone's potentiometer, and thus regulate its rate of vibrato.*

## 4.4 Timbral Aspects

The sound-world, mixing breathy clarinet sonorities with vibraphones, marimbas and bells is at once arid and shimmering.<sup>8</sup>

Peter McCallum, in 1991, wrote the above statement in a review of Shanahan's piece *Echoes/Fantasies*. However, a similar comment – making the necessary changes regarding instrumentation – could equally have been used to describe the “sound-world” of *Cycles of Vega*.

The global sonic impression of *Cycles of Vega* is a prominent and important characteristic of the piece. Each of the three main sections is coloured in its own way by a carefully demarcated set of percussion instruments in combination with various distinctive sonorities from the clarinet. (The preface to the score outlines the numerous extended techniques that have been employed to enhance and modify the clarinet's intrinsic timbre; these include multiphonics, microtones, vibrati, pitch-bends, teeth-on-reed, unusual articulations, air-sounds, and key-finger sounds (Ex.3-6).) Locally, Shanahan often treats individual pitches/durations/colours or other fragmentary gestures as self-contained musical events as well.

In accordance with the work's temporal design, the organization of timbre within *Cycles of Vega* is also cyclical, with each timbral cycle encompassing a fixed set of timbres which intermingle among themselves. The span of each timbral cycle matches the duration of its equivalent rhythmic cycle.

### 4.4.1 Timbral Cycles within the Percussion Part

In section one (bars 4–35), twelve of the twenty-six percussion instruments required in *Cycles of Vega* are exhibited. The composer freely arranged the instruments within the pre-composed rhythmic structure. For each repeat of the rhythmic cycle, though, Shanahan presents the same instruments – but in a varied order. Whilst the majority of durations within each rhythmic cycle are allocated different timbres, the composer keeps constant the number of times he uses each instrument per cycle. (Two exceptions are the suspended cymbal and

sizzle cymbal):

#### Ex.4-14. Percussion timbres, bars 4–35.

##### Percussion Instrument Abbreviations – Section One (bars 4–35)

**Colot.** = colotomy {'vibraslap glissando'}      **Sleigh** = sleighbells  
**Cowb** = cowbells      **BaW** = bamboo-tube windchime  
**ShW** = shell-disc windchime      **SUW** = sea-urchin-spine windchime  
**Vbslp** = vibraslap (played normally)      **HW** = herd-bell windchime  
**WW** = wooden-rod windchime

NB: — = a *variable instrumentation* (although for certain of these durations here, within three out of their four isorhythmic cycles they have been matched to precisely the same timbre, thereby rendering them quasi-isochromal). Moreover, any durations whose numbers below are underlined have undergone some sort of minor alteration.

##### Layer

|            |                   |           |           |           |           |                  |                  |                  |           |
|------------|-------------------|-----------|-----------|-----------|-----------|------------------|------------------|------------------|-----------|
| <b>I</b>   | R duration-number | <b>9</b>  | <b>28</b> | <b>26</b> | <b>27</b> | <b>7</b>         | <b>8</b>         | <b>6</b>         | <b>25</b> |
|            | Instrument        | Colot.    | Cowb 3    | ShW 1     | Vbslp     | WW 1             | Sleigh           | BaW 1            | SUW 1     |
| <b>II</b>  | R duration-number | <b>20</b> | <b>19</b> | <b>4</b>  | <b>24</b> | <u><b>21</b></u> | <u><b>9</b></u>  | <u><b>13</b></u> | <b>2</b>  |
|            | Instrument        | Colot.    | —         | —         | Vbslp     | —                | —                | —                | Vbslp     |
| <b>III</b> | R duration-number | <b>24</b> | <b>23</b> | <b>5</b>  | <b>22</b> | <u><b>21</b></u> | <u><b>14</b></u> | <b>13</b>        | <b>4</b>  |
|            | Instrument        | —         | ShW 2 *   | —         | —         | —                | —                | —                | —         |
| <b>IV</b>  | R duration-number | <b>10</b> | <b>11</b> | <b>12</b> | <b>12</b> | <b>10</b>        | <b>11</b>        |                  |           |
|            | Instrument        | Colot.    | —         | —         | —         | —                | —                |                  |           |

##### Layer

|            |                   |          |           |           |          |           |
|------------|-------------------|----------|-----------|-----------|----------|-----------|
| <b>II</b>  | R duration-number | <b>1</b> | <b>22</b> | <b>14</b> | <b>3</b> | <b>23</b> |
|            | Instrument        | —        | Cowb 3, 4 | —         | —        | Cowb 4, 3 |
| <b>III</b> | R duration-number | <b>3</b> | <b>29</b> | <b>9</b>  |          |           |
|            | Instrument        | —        | —         | HW        |          |           |

\* NB: during the initial isorhythmic cycle, the windchime here is instead **SUW 2** – this being a late change that I made within **Cycles of Vega's** score (despite its sketch-materials).

The composer regulates the vibraslap differently from the other eleven percussion instruments in section one. While the other percussion timbres circulate amongst themselves, the position of the vibraslap within each (rhythmic) cycle remains constant: it is always assigned to the same durations for each repeat. This technique can be seen as a unifying feature within the timbral cycle. The relevant bars are as follows:

#### Ex.4-15. The vibraslap as a colouristic 'anchor' in timbral cycles, bars 4–35.

[The vibraslap is heard on the opening beat of sections A, B, C and D]

In section two (bars 40–177), all of the percussion instruments are employed with the exception of the vibraslap, which may have been avoided due to its significant timbral role in section one. As before, the instruments are distributed variably amongst the durations of the rhythmic cycles. Slight variations in instrumentation are made between each cycle; these serve mainly to tint each subsection’s overall timbral effect.

The vibraphone, crotales and *rin* dominate the soundscape of the percussion in section three (bars 180–214). The triangle windchimes, as well as the chinese, suspended and sizzle cymbals, are also present. The timbral cycles within this section exhibit the same principles as those of the previous two sections.

#### 4.5 Pitch Aspects

In general, the pitch-structures of *Cycles of Vega* are ‘freely composed’, not being derived from any pre-compositional or serial schemata – unlike the work’s chromomorphology.<sup>9</sup> This is also the case for the work’s companion piece, *Echoes/Fantasies*: in an analysis of this earlier work, Shanahan states that “this [reliance upon direct intuition] is because, from a psychoacoustical point of view, pitch-structures alone are incapable of defining any but the most obvious foreground (macro)structures”.<sup>10</sup> Therefore, the macrostructure of *Cycles of Vega* is defined not by pitch, but by temporal and timbral manipulations, the three main sections being related solely through temporal procedures.

The use of selective techniques and fingerings in the clarinet part nonetheless restricts the pitches available, thus producing a ‘tuning system’ from which the clarinet part is derived. Also, Shanahan’s exploration of other instrumental resources and his inclusion of various non-standard percussion instruments in the score of *Cycles of Vega* call for new, unconventional ways of approaching the element of pitch: by selecting windchimes, ‘unpitched’ percussion, *rin*, and original instruments made by himself, the composer is automatically restricted to the immutable pitches that arise from these instruments. *Cycles of Vega* is, therefore, firmly underpinned by the unique, inherent tuning system generated by the composer’s collection of instruments and playing techniques. Within such a system, the distinction between pitch and timbre of an instrument, or indeed of an acoustic event, often becomes tenuous.

Sometimes, the choice of pitch was rigidly determined by technical exigencies. For example, Shanahan initially envisaged this piece being played by two instrumentalists: one percussionist, and a clarinetist who also plays other percussion instruments simultaneously at specified times. Consequently, in the sketches for *Cycles of Vega*, Shanahan devised several charts displaying those “single-hand resources” which were available for the *e♭* clarinet. These fingerings and their resultant pitches are included in the preface to the score. This technique limited quite considerably the set of pitches which were available for certain sections of the piece.

Much of the percussion is unpitched, or the percussion instruments' timbres make pitch-discrimination difficult (particularly in rapid note-successions). The stochastic nature of the windchimes in particular makes normal pitch-notation quite impossible. As a result, the selection and arrangement of percussion instruments is most often decided for timbral reasons. Similarly, in the clarinet part, the pitches (either individually or in cells) are chosen as much for their inherent colour as for any grammatical relationship between the pitches themselves.

#### 4.5.1 Clarinet Pitches

Within section one (bars 4–35), Shanahan utilizes all twelve pitch-classes of the chromatic scale. These are arrayed in a hierarchy of two cyclical levels. The primary cycle corresponds to the pre-composed 24-quaver-beat rhythm discussed in 4.2.1, its durations being grouped in a pattern of 17 + 20 + 11 semiquavers. The pitches are arranged to fit upon these three rhythmic subgroups. Each of the subgroups is distinguished by a special effect in the clarinet part: a multiphonic trill-portamento; and a technique (intended to imitate the sound of the vibraslap) which combines fluttertonguing, key vibrato and air-sounds. On a second cyclical level, three epicycles (pitch-sets x, y, and z in Ex.4-16) work within the main pitch-cycle. These epicycles encompass smaller groups of pitches which interchange amongst themselves:

##### Ex.4-16. Clarinet pitch-cycles, bars 4–35.

|                |              |                              |              |              |              |             |                              |              |             |              |             |              |              |                              |             |              |
|----------------|--------------|------------------------------|--------------|--------------|--------------|-------------|------------------------------|--------------|-------------|--------------|-------------|--------------|--------------|------------------------------|-------------|--------------|
| <b>Pitch:</b>  | G $\sharp$ 4 | D $\flat$ 3                  | F $\sharp$ 5 | B $\sharp$ 4 | C $\sharp$ 3 | A $\flat$ 4 | D $\sharp$ 3                 | C $\sharp$ 5 | B $\flat$ 4 | E $\sharp$ 3 | B $\flat$ 3 | F $\sharp$ 5 | C $\sharp$ 5 | F $\sharp$ 3                 | E $\flat$ 3 | A $\sharp$ 4 |
| <b>Number:</b> | 1            | 2                            | 3            | 4            | 5            | 6           | 7                            | 8            | 9           | 10           | 11          | 12           | 13           | 14                           | 15          | 16           |
|                | (            | $\leftarrow$ x $\rightarrow$ | )            | (            |              |             | $\leftarrow$ y $\rightarrow$ |              |             | )            | (           |              |              | $\leftarrow$ z $\rightarrow$ |             | )            |

M = multiphonic trill-portamento (colotomy);

V = an 'ersatz vibraslap' (random air-noises, fluttertonguing, key-vibrato, and key/finger-sounds).

|                   |                   |                   |                   |                   |                 |   |
|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------|---|
| <b>Spans:</b>     | 17 $\text{♩}$ s   | →                 | 20 $\text{♩}$ s   | →                 | 11 $\text{♩}$ s | → |
| <b>Cycle Bars</b> | <b>Epicycle 1</b> | <b>Epicycle 2</b> | <b>Epicycle 3</b> | <b>Epicycle 4</b> |                 |   |
| <b>I</b> 4–10     | M 1 2 3 V         | 4 5 6             | 7 8 9 10 V        | 11 12 13 14 15 16 |                 |   |
| <b>II</b> 10–16   | M 2 1 3 V         | 6 5 4             | 9 10 7 8 V        | 11 12 13 14 15 16 |                 |   |
| <b>III</b> 16–23  | M 1 2 3 V         | 5 6 4             | 10 8 9 7 V        | 11 12 13 14 15 16 |                 |   |
| <b>IV</b> 23–29   | M 2 1 3 V         | 4 6 5             | 8 7 9 10 V        | 11 12 13 14 15 16 |                 |   |
| <b>V</b> 29–35    | M 1 2 3 V         | 4 5 6             | 7 8 9 10 V        | 11 12 13 14 15 16 |                 |   |

In section two (bars 40–177), the clarinet part is intuitively composed. Its arrangement of pitches can be subdivided into three main sections A, B, and C – bars 40–85, bars 86–131, and bars 132–177, respectively – corresponding in length to the main cycle of the percussion part. Both the rhythms and pitches of subsection A bear little resemblance to those of subsection B. But the third subsection, C, is clearly a combination of the material in subsections A and B,

**Ex.4-17. The aggregation of material in the clarinet part, bars 40–177.**

**Handwritten Musical Score for "The Cosmic Clockwork"**

**System 1:**

- Tempo:**  $\text{♩} = 4/3$ . Extremely slow, distant and dream-like; timeless and inexorable, but rhythmically precise, like a huge cosmic clockwork.
- Clarinet (Clarin.):**
  - Key signature:  $F\sharp$
  - Time signature:  $3/8$
  - Dynamic:  $p$  poss. (barely (only just) audible).
  - Performance instruction: *very pure and distant.*
  - Dynamic markings:  $ppp$ ,  $pp$ ,  $< >$  *pico*,  $ppp < p$
- Percussion (PERC. 1):**
  - Instrument: *Coil*
  - Time signature:  $2/8$
  - Dynamic:  $pp$ ,  $mp$

**System 2:**

- Clarinet (Clarin.):**
  - Key signature:  $F\sharp$
  - Time signature:  $5/16$
  - Dynamic:  $ppp$ ,  $mp$ ,  $p$
  - Performance instruction: *echoing the Dove, Perc. 2.*
  - Dynamic markings:  $pp$  *choppy*
- Percussion (PERC. 1):**
  - Instrument: *Coil*
  - Time signature:  $2/16$
  - Dynamic:  $pp$ ,  $p$  *poss.*

Gradually increase the tempo to  $\text{♩} = 134$ , as indicated, heightening the tension....

Handwritten musical score for a clarinet and percussion. The score is divided into two systems. The first system starts with a 3/8 time signature and a key signature of one flat (B-flat). It features a clarinet part with various ornaments (trills, grace notes) and a percussion part with a 'Coil' instrument. The tempo is marked as 134. The second system starts with a 4/4 time signature and a key signature of one sharp (F-sharp). It continues the clarinet and percussion parts with more complex ornaments and dynamics. The tempo is marked as 44. The third system starts with a 5/16 time signature and a key signature of one sharp (F-sharp). It features a clarinet part with a 'brilliant, agile' marking and a percussion part with a 'Coil' instrument. The tempo is marked as 16. The fourth system starts with a 2/16 time signature and a key signature of one sharp (F-sharp). It continues the clarinet and percussion parts with more complex ornaments and dynamics. The tempo is marked as 16. The score is written in a handwritten style with various musical notations, including notes, rests, ornaments, and dynamics.

(C) *Cycles of Vega*, bars 132–142.

Section two also borrows material from *Echoes/Fantasies*. An example of a direct quote in *Cycles of Vega* from its “companion piece” can be found at bars 70–71, matching bars 101–102 in *Echoes/Fantasies*. This phrase is repeated in *Cycles of Vega* at bar 162, but in an ornamented form: it corresponds to bar 129 of *Echoes/Fantasies*. The phrase is shown in Ex.4-18, in both its basic and ornamented form:

**Ex.4-18. Quotations from *Echoes/Fantasies*’ bass clarinet part found in *Cycles of Vega*’s e♭ clarinet part.**

(a) *Echoes/Fantasies*, bars 101–102.

*Cycles of Vega*, bars 70–71.



(b) *Echoes/Fantasies*, bars 129–130.

*Cycles of Vega*, bars 162–163.

The clarinet's pitch-cycle in section three (bars 180–214) follows the rhythmic cycle of the percussion part. The pitches retain the same duration, order and register for each subsequent repeat of the cycle, with only a slight variation in bars 186–187. In this section, the selection of pitches was severely restricted by the initial requirement of the composer to have the clarinetist play the clarinet with fingerings that employ only the right hand, while striking the *rin* with a wooden beater held in the left hand. Notwithstanding, the clarinet's pitches were also chosen to harmonize with the *rin*.

#### 4.5.2 Selection of the *Rin*

The choice of *rin* is particularly crucial in section three (bars 180–214), where the *rin* allotted to the clarinetist define their own pitch-cycles. As discussed in 4.2.4, the percussion part in section three is formed from three superimposed rhythms arising from the subpermutations of R. (One of these layers is allocated

solely to the *rin* [see Ex.4-8].) Unlike the clarinet's cycles here, which correspond in length to the rhythmic patterns of the percussion, the clarinetist's seven *rin* pitches are independently segregated into four cycles of 5 + 5 + 5 + 6 tones. The first three cycles use only the *rin* numbered 1 to 6, while the fourth cycle includes the seventh (deepest) *rin*, which is played in bar 205 on the longest duration of the rhythmic cycle, where it also has the loudest dynamic among the other *rin* in this cycle, thus highlighting its timbre. In the score, Shanahan has included the number of each *rin* above its notehead, in order to facilitate rapid recognition.

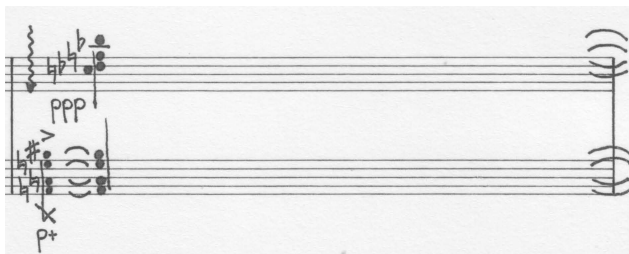
### 4.5.3 Vibraphone Harmonies

The vibraphone harmonies are freely composed – they are not subject to any pre-compositional restrictions – and repeat in accordance with the rhythmic cycles of the percussion part. The timbres which result from the vibraphone's 'chords' spring from the inherent colour of the intervals upon which they are based. Almost every 'chord' embraces the interval of a major 2nd, although intervals of a 4th (perfect and augmented), major and minor 6ths, 7ths, and 9ths also feature quite prominently – the major intervals in particular. The most commonly used intervals add greatly to the global colour of *Cycles of Vega*.

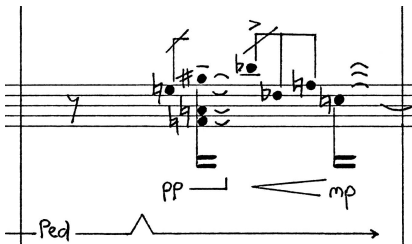
The vibraphone parts in *Cycles of Vega* and *Echoes/Fantasies* clearly have related material. Two examples where chords are quoted directly from *Echoes/Fantasies* are given in Ex.4-19:

#### Ex.4-19. Quotations from *Echoes/Fantasies*' vibraphone part found in *Cycles of Vega*'s vibraphone part.

(a) *Echoes/Fantasies*, bars 69, 97, and 125.



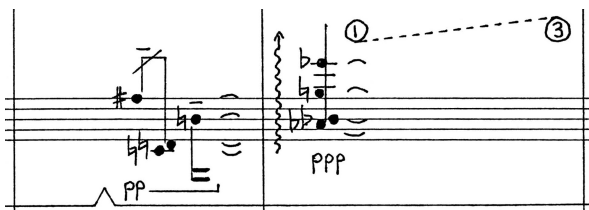
*Cycles of Vega*, bars 43, 89, and 135.



(b) *Echoes/Fantasies*, bars 90, 118, and 146.



*Cycles of Vega*, bars 65–66, 111–112, and 157–158.



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Endnotes

1. Shanahan (Interview, September 1993).
2. Shanahan (*Cycles of Vega*, programme note, 1991).
3. *ibid.*
4. *ibid.*
5. The vibraslap is acoustically related to a Latin-American instrument known as the *quijada*, which is made from the jawbone of a donkey. The player holds the lower mandible in one hand and strikes it towards the top with the fist of the other hand, making “loose teeth” rattle. Shanahan’s use of the vibraslap’s hard wooden ball as a mallet to strike cymbals or the resonator tubes of the vibraphone is a technique that is apparently unique to *Cycles of Vega*.
6. Shanahan (Interview, September 1993).
7. Shanahan (Preface to *Cycles of Vega*, 1990), p.iii.
8. McCallum (November 13, 1991).
9. The term ‘chronomorphology’ is a neologism, which Shanahan invented for his own purposes in *Recorder Unlimited* [Shanahan (1993), p.109, en.20]:

It seems that, whilst there is ample musical jargon appertaining to pitch and pitch-relations, there is actually a dearth of terminology for the discussion of musical time and time-relations. I have therefore found recourse to create the – admittedly rather cumbersome – neologism “chronomorphology”, which equates generically to ‘the morphology of time’, or, more specifically herein in regard to a piece of music, to ‘the formal/structural organization (at and between various architectonic levels) of the time-domain within a musical composition’.
10. Shanahan (October 1985), p.2.

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## 5. THE COMPOSER'S INTENTIONS AND AUDIENCE RECEPTION

Shanahan views the act of composing, performing or listening to music as a 'ritual' experience. He sees music as a sacrament in itself, whereby it connects the visible, corporeal, tangible world to something beyond – something invisible, transcendental and untouchable:

Men may see or feel in all things something more than the things themselves. So the sacramental comes into existence.

A sacrament, our catechism said, is 'an outward and visible sign of an inward and spiritual grace'. The outward and visible attributes, which can never be the whole of existence or the whole of experience, are balanced and completed by attributes 'inward and spiritual'. Between them is the connecting link of a sign, something seen, touched, handled, eaten, painted, sung, danced, or spoken. The sign, like the arrow on the weather vane, points to something beyond itself and invisible.<sup>1</sup>

In discussing his own role as a composer, Shanahan enthusiastically cites the following statement:

The role of the composer and performer is obvious ...: they are the alchemists who help to transmute the Earth by making its substance and souls resonate with echoes of the heavenly music. In so doing, these earthly echoes also [become] audible in Heaven, and the gulf between the two thereby closes by another hairsbreadth. This is the accomplishment of the Great Work of musical alchemy which, like alchemy proper, aims towards the redemption of all Nature as well as to the reunion of Man with his Overself.<sup>2</sup>

Irrespective of how obvious (or obscure) the above statement may be to his audience, Shanahan takes this metaphysical role – the 'binding of Heaven to Earth' via music – very seriously. Through his music, he aspires to bring both the earthly and cosmic realms together, with humanity in between. He hopes to provide an experience which puts people into a state of contemplation whereby they will ponder universal concepts and philosophies and then, after the piece is over, remain moved to keep some of their ruminations with them in their everyday life.

A message he wishes to convey is one of humility, emerging from the Hermetic Philosophy, wherein human beings are seen to be microcosms of the whole – the macrocosm. In his own words:

We must be humble, and look beyond our immediate local situations to see that we are part of something far bigger: we belong ... in a much wider sense; we, whose very atoms were born in the hearts of stars, are children of the Universe, and more ... this I find very comforting ... an act of grace.<sup>3</sup>

Characteristic of much of Shanahan's music is the sense of what Peter McCallum has called "galactic awe",<sup>4</sup> as well as cavernous silences which allow for such contemplations. He intends his music to pose absolute questions, not dispense absolute answers.

In combination with his extended compositional techniques, Shanahan's music is rendered 'complex'<sup>5</sup> through his multi-levelled invocations of scientific and mathematical paradigms of nature and the Universe: his music demonstrates both acoustical *and* mental polyphonies. Through its complexity, Shanahan hopes that he creates "music that is absolutely 'relevant' because it aspires to replicate the complexity of the Cosmos (as we know it), and so touches us with its palpable realism".<sup>6</sup>

Shanahan has indicated during interviews that for any performance of his music, an informed, open-minded and receptive audience is desirable. This is emphasized by his often lengthy and detailed programme annotations, which include information on the philosophical, theosophical (or theological), and scientific concepts upon which a piece is founded, in addition to commentary on musical aspects such as its instrumentation and form.

It is still possible, however, to engage with Ian Shanahan's music without being informed of all (or, indeed, any) of its musical and philosophical nuances. The sound-world of Shanahan's music has a unique attraction of its own, and in *Cycles of Vega*, it provides a foreground to the work which is easily accessible to the listener – and may invite some to 'scratch beneath the surface'. The more detailed or esoteric levels behind this foreground may not be immediately apprehensible, but they are integral to the *raison d'être* and aesthetic essence of the piece, and do impart at least a subliminal awareness of the work's depth and its sense of 'mind'. Nevertheless, with an obvious hint from the title, it is possible for a keen musical ear to hear, to consciously register, the cyclic structures within *Cycles of Vega* without prior study of the work.

Due to the newness of *Cycles of Vega* and the fact that it has only received one public performance to date – at the Second *Sydney Spring International Festival of New Music* during 1991 – it is hard to find any definitive critical response. In a review of the Festival, Peter McCallum described *Cycles of Vega* as a "striking new piece".<sup>7</sup> And in brief interviews with the Australian composers Peter Sculthorpe and Anne Boyd, *Cycles of Vega* was greeted with amiable praise.

As one of Shanahan's composition teachers, Sculthorpe acknowledges that he knew *Cycles of Vega* while it was being composed, and was therefore aware of the thinking and detail behind the piece. Despite this, Sculthorpe admits that he does not contemplate the universal concepts which Shanahan tries to instil via his music; he prefers, rather, to "sit back and enjoy" the sound-world of the piece, which he finds "extremely accessible", having "beautiful sounds ... particularly the ending".<sup>8</sup> Sculthorpe also pointed out that whilst *Cycles of Vega* is a 'complex' work, it does not actually sound complex to him.<sup>9</sup>

By contrast, Anne Boyd heard *Cycles of Vega* without having any prior knowledge of the work's philosophical and scientific background, and before reading any programme notes. Her first impressions were of a "planetary journey ... touching stars".<sup>10</sup> In addition, she said that she could "feel the cycles" within the work and, like Sculthorpe, commented on the "lovely sounds" and "timbral colours" within *Cycles of Vega*.<sup>11</sup>

With regard to his audience, and their response to his music, Shanahan has the following to say:

Are not both the *qualitative* aspects of an audience's response and the *quantity* of people reached conceptually equivalent in value? Surely engaging and deeply affecting a solitary human being through exposure to a work of Art is as great a cause for celebration by the Artist as the mass entertainment or amusement of a larger public body? Won't as many people be touched ultimately by the transcending "Arrows of Time and Space" which allow a difficult Artwork's message to emanate outwards geographically and reach Humanity far into the future, well beyond the isolated and frozen instants of a single restricted, more commercially-oriented or fashionable artistic event that impinges upon only a large, but fixed, group of people at a particular place?<sup>12</sup>

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Endnotes

1. Trapp (1975), p.81.
2. Godwin (Rochester, 1987), p.81.
3. Shanahan (Interview, June 1993).
4. McCallum (August 24, 1987).
5. Toop (Spring 1988), p.4:

The term 'complex' in the context of this paper refers to the 'relative difficulty of technical execution and density of musical substance'.
6. Shanahan (*Context*, Summer 1991), p.35.
7. McCallum (November 4, 1991).
8. Sculthorpe (Interview, September 1993).
9. *ibid.*
10. Boyd (Interview, September 1993).
11. *ibid.*
12. Shanahan (Winter 1992), p.31.

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## 6. CONCLUSION

As a composer, Ian Shanahan is near the beginning of his career, still trying to establish his own personal mark. It is, therefore, difficult to situate him amongst composers of today. There is, however, clearly an element of ‘complexity’ in his music (and so a connection with the work of ‘The New Complexity’), stemming primarily from his application of mathematical concepts.

Mathematical models are also an area of interest for the Australian composer Chris Dench (b.1953), whom Shanahan sees as being ‘on a similar wavelength’ to him. He also points out that Dench has had a positive critical influence on his work. Shanahan explains how he had begun to falter by using instrumental techniques purely as acoustical effects, and rather indiscriminately, to mould the surface of his music; Dench brought this to Shanahan’s attention, who has since tried to avoid writing music which relies excessively upon surface gestures rather than musical depth.<sup>1</sup> The critic Peter McCallum also associates elements of Shanahan’s compositional style with that of Chris Dench, explaining that both use music to express very individual esoteric and scientific concepts. As a result, the methods and ideas they apply to their musics do tend to stretch the listener “outside the normal response mechanism”.<sup>2</sup> McCallum believes both Dench and Shanahan to be two very individual composers.

It has already been pointed out that Shanahan does wish to appeal to an informed, open-minded audience, and that some of his music, by virtue of its sensuous nature, does indeed have an instant appeal. Nevertheless, immediate audience response, understanding, and assimilability are not central to Shanahan’s aesthetic. In fact, an intrinsic part of Shanahan’s compositional persona is his unrelenting reaction against any compromise through seeking ‘easy’ audience acceptance and commercial ‘marketability’, especially through the use of what he sees to be second-hand, retrospective musical syntaxes.<sup>3</sup> The question of ‘accessibility’ has in fact been pivotal among the issues Shanahan has raised in his writings and polemics in journals such as *Sounds Australian*, which have often raised controversy. Until recently actively involved in the politics of music, Shanahan has been a committee member and Secretary of the Australian branch of the *International Society for Contemporary Music* (1983–1993) and President of the *Fellowship of Australian Composers* (1988–1992), and has no fear of standing up for his own beliefs. The Australian composer Moya Henderson has commented briefly on his commitment, saying that he is much admired for the role he takes upon himself, and that many are grateful for his efforts. Nevertheless, she fears that he may have made some enemies.<sup>4</sup>

In summary, the following can be said of Shanahan’s approach to music and compositional style:

Shanahan’s interests in philosophy, theology, science, mathematics and cosmology are a central influence upon his musical style. He consciously tries to imbue his music with these pursuits at every level. Such a conceptual approach to musical composition stems from his personal view that science, music and



theology are closely interlinked, as represented by his metaphor of the ‘sacred triangle’.

The emphasis Shanahan places upon this ‘sacred’ relationship manifests itself in several ways: he often uses scientific and mathematical paradigms as a foundation for his compositions. In *Cycles of Vega*, this is achieved through its hierarchic cyclical structures (which reflect astronomical, natural, and biological cycles), and its reliance upon a panoply of windchimes (whose mechanics exemplify Chaos Theory). Through such methods, Shanahan aims to create “a music which is not just a lifeless ‘acoustical orrery’, but a metaphorical mirror, a truly vibrant model, of the Cosmos”.<sup>5</sup>

His music also affirms his belief in the primacy of the time-domain, as reflected by its spaciousness, its resonance, and the duration of its sounds and silences. These elements are engaged as ‘meditative tools’, through which the listener is invited to contemplate the universal archetypes that inspired his music. Shanahan views the creation and experiencing of music as a sacramental act, through which the listener can transcend beyond ‘mundane time’, into the realm of ‘sacred time’, bringing the earthly and cosmic, Heavenly realms closer together.

Another of Shanahan’s key concerns is the extension of sonic possibilities in the world of music, where he ardently promotes the notion of ‘sounds unlimited’. Through his compositions, he experiments with new sonic devices and explores the use of extended techniques on traditional instruments. These open up a colourful new universe of timbres, which Shanahan clearly explores in his compositions, contributing to their unique sound-worlds.

Shanahan’s compositional techniques depose pitch as music’s fundamental organizational element: the fabric of his music relies more upon the pre-eminence of time and time-relations. The innovations of Olivier Messiaen have clearly encouraged Shanahan to move in such a direction, as evidenced particularly in Shanahan’s *Echoes/Fantasies* and *Cycles of Vega*, where the system of permutations used is parallel to those of Messiaen’s *Chronochromie* and other works.

While *Cycles of Vega* has legitimate claims to being a unique piece – taking steps forward both in its compositional techniques and in its sonorities – it nevertheless exists within an historical continuum. Techniques employed by Shanahan reach back to fourteenth-century isorhythm, and more recently (during this century) to Messiaen’s rhythmic organization and the new sound-worlds of experimental composers such as Edgard Varèse and John Cage.

Whilst many are instantly attracted to the appealing sonorities of Ian Shanahan’s music, it is definitely music which repays repeated listening. As one gains more insight into the background and intricate structural subtleties of his music, one finds more and more facets to appreciate. But the recency of Shanahan’s work – and of *Cycles of Vega* in particular – implies that there is, as yet, little audience response available. As with all new music, it is impossible to arrive at any definitive value judgements of Shanahan’s work. Like all artistic

endeavours throughout history, only 'time will tell' how well Shanahan's music is revered.

### Endnotes

1. Shanahan (Interview, 2.11.93).
2. McCallum (Interview, 2.11.93).
3. See Shanahan (Spring 1989), Shanahan (October 1990), Shanahan (Spring 1991), Shanahan (*Context*, Summer 1991), Shanahan (*Sounds Australian Journal*, Summer 1991), Shanahan (September 1992), Shanahan (November 1992), Shanahan (December 1992), and Shanahan (October 1993).
4. Henderson (Interview, 3.11.93).
5. Shanahan (Interview, 2.11.93).

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As the title of this paper implies, it has only been feasible for me to 'glimpse' into the mind and music of Ian Shanahan. I am, therefore, very grateful to Ian Shanahan for compiling almost all of this Bibliography, for it has directed me to a much wider range of reading and knowledge pertinent to this subject than would otherwise have been possible: it should prove to be a valuable resource for anyone wishing to research further into this area in future.

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## WRITINGS BY IAN SHANAHAN

### A. Journal Articles, Lecture Papers, Reports, Letters and Unpublished Material.

1. "Analysis of *Echoes/Fantasies* (1984) for bass clarinet, vibraphone(s) and tubular bells", Unpublished Analytical Writing, Sydney, Australia, October 1985.
2. "31 Note Music by Bill Coates: Fingerings for Alto Recorder", Unpublished Information Sheet, Sydney, Australia, February 1986.
3. "A Basic Circe Variant: Strict Circe", *The Problemist* Vol.12 No.10 p.194, July 1986.
4. "Recorder Unlimited: An Introduction with special consideration of Multiple Sonorities": lecture paper delivered to the Sydney Branch of *The Musicological Society of Australia*, The University of Sydney, August 2, 1986.
5. "Recent Australian Music": Australian Country Report to *The 11th Asian Composers' League Conference*, Taipei, Taiwan, October 1986.
6. "ELISION ... The Cutting Edge of Sound", *The Australian Composer: Newsletter of the Fellowship of Australian Composers* p.3, August 1987.
7. "The Eleventh Asian Composers' League Conference/Festival", *The Australian Composer: Newsletter of the Fellowship of Australian Composers* pp.4–5, August 1987.
8. Conference Paper: Seminar C (Contemporary Recorder Techniques), *Asian Composers' Forum in Sendai*, Japan, September 19, 1987.
9. "Sounds Unlimited", *1988 Blue Mountains Festival Performing Notes*, The Blue Mountains Festival Ltd., Darlinghurst NSW, Australia, pp.12–15, 1988.
10. "Success Stories", *The Australian Composer: Newsletter of the Fellowship of Australian Composers* p.7, December 1988.
11. "Recent Travels", *The Australian Composer: Newsletter of the Fellowship of Australian Composers* pp.7–8, December 1988.
12. "The Theory of Bitones", *Ossia* No.1 pp.17–23, Winter 1989.
13. Letter to the Editor captioned: "APC Headache (No.2)", *Sounds Australian: Australian Music Centre Journal* No.23 pp.1–2, Spring 1989.
14. Brief [heavily edited] analyses of compositions by Eric Gross (*3 Klavierstücke*) and Peter Tahourdin (*Quartet for Strings*) in the *Handbook* accompanying the *Anthology of Australian Music on Disc*, Canberra School of Music, December 1989.
15. "Australian Music During 1989": Australian Country Report to *The 13th Asian Composers' League Conference/Festival*, Tokyo/Sendai, Japan, March 1990.
16. "Manifesto", Unpublished Writing, Sydney, Australia, October 1990.
17. "Audibility and Inaudibility in Twentieth-Century Music: *Arcturus Timespace* (1987), by Ian Shanahan", Unpublished Writing, Sydney, Australia, November 1990.
18. "Ideal Circe Serieshelpstalemates with KBS versus K", *Ideal-Mate Review* No.40 p.15, April-June 1991.

19. "Blueprint for a Piece: Ian Shanahan's Sure-Fire Recipe for Music comprised of Fractal Sounds generated by a Prepared Alto Recorder", Unpublished Information Sheet, Sydney, Australia, May 22, 1991.
20. "Multicultural Influences on Australian Composition", in *The Composer Speaks: Composers and Their Colleagues Discuss Australian Music* (ed. Graeme Skinner), Sounds Australian, Sydney, Australia, pp.32–35, June 1991.
21. "Recorders Now and Then", [Review] *The Recorder: Journal of the Victorian Recorder Guild* No.13 pp.23–24, June 1991.
22. Letter to the Editor captioned: "When is Humour Humorous?", *Sounds Australian: Australian Music Centre Journal* No.31 p.3, Spring 1991.
23. "The Malaise of (not just) Australian Music", *Context* No.2 pp.34–37, Summer 1991.
24. Letter to the Editor captioned: "Not the Thought Police", *Sounds Australian: Australian Music Centre Journal* No.32 p.2, Summer 1991.
25. "The Asian Composers' League, and Related Issues", *Sounds Australian Update* pp.11–12, December 1991 – January 1992.
26. "Eric Gross: A Profile of the Composer", in *Contemporary Composers* (ed. P. Collins and B. Morton), St James Press, London, pp.350–351, 1992.
27. (ed., with Chris Dench): "An Emotional Geography of Australian Composition", *Sounds Australian: Australian Music Centre Journal* No.34 pp.8–32, Winter 1992.
28. Letter to the Editor captioned: "More acoustical goulash", *Sounds Australian Update* p.3, September 1992.
29. Letter to the Editor captioned: "Invocation: Live and Let Live!", *Sounds Australian Update* pp.3–4, November 1992.
30. "Some Random Thoughts on John Cage (1912 – 1992), and 'New' Music", Unpublished Paper, Sydney, Australia, December 21, 1992: delivered as a Radio Lecture/Performance as part of *A Tribute to John Cage: Returning the Compliment*, ABC-FM Stereo, December 21, 1992.
31. "A Hierarchical Metalogue on Accessibility, Innovation and Parasitism", Unpublished Writing, Sydney, Australia, October 1993.

## B. Books and Monographs.

1. *The Avant-Garde Recorder: A Preliminary Study of some Recent Developments in Alto Recorder Playing Techniques, and their Notation*, B.Mus.(Hons.) Thesis, The University of Sydney, November 1985.
2. *Recorder Unlimited: A Preliminary Study of the Alto Recorder's Multiphonic Resources*, Ph.D.(Prelim.) Thesis, The University of Sydney, April 1993. To be published by the University of California Press, Berkeley, California, U.S.A., in "The New Instrumentation" series, during 1994.

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COMPOSITIONS BY IAN SHANAHAN

The following compositions are all published by the Australian Music Centre [Sounds Australian] in facsimile, except for those marked *:

Piece for Chamber Orchestra (1980). Chamber Orchestra. Duration: ca.3'. Private Performance. *

Fanfare for Caissa (1980). 3 Trumpets. Duration: ca.4'. Performed by students of the Royal College of Music, London; cond. Sir David Willcocks, Royal Albert Hall, London, May 1981. Recorded by the British Chess Problem Society.

Legends (1981). Solo Flute. Duration: ca.9'. Performed by Joannes Roose, Seventh Australian Flute Convention, April 2, 1988. Recording (ABC?) of this performance available from the Australian Music Centre [Sounds Australian].

Entr'acte (1981). 6 Percussionists. Duration: ca.2'. Unperformed. *

Pastels (1982). Solo Clarinet in A. Duration: ca.5'. Performed by Lawrence Dobell, Seymour Group Concert, April 28, 1983 [Première]. On CD: "Music for a Champagne Breakfast" (Evasound Records Jade JADCD1040), available from the Australian Music Centre [Sounds Australian].

Cortège (1982). 1 Alto Trombone, 2 Tenor Trombones, 1 Bass Trombone, 7 Percussionists, Harp, Piano. Duration: ca.4'. Unperformed. *

Cosmos (1982). Solo Piano. Duration: ca.3'. Unperformed. *

Echoes (1983). Orchestra. Duration: ca.8'. Performed by the ABC National Training Orchestra, cond. Wilfred Lehmann, May 1983 [Première]; and by the Queensland Symphony Orchestra, cond. David Kram, February 1984. Recorded by the ABC. * [Withdrawn]

Echoes/Fantasies (1984). Bass Clarinet, Percussion: [Vibphn(s), Tub. Bells]. Duration: ca.7½'. Commissioned by the Seymour Group. Performed by Nigel Westlake (Bass Cl.) and Michael Askill (Perc.), ISCM Concert Series, Recording Hall, Sydney Opera House, June 16, 1985. On CD: "Earth Spirit" (Evasound Records Jade JADE1013), available from the Australian Music Centre [Sounds Australian].

Lament (1985). Solo Tenor Voice. Duration: ca.2'. Unperformed!

Music for the documentary film *God Doesn't Play Dice* (1985). *

Music for the documentary film *Mysteries of the Mind* (1986). *

Arcturus Timespace (1987). Soloist [Amplified Mandolin, Percussion], Tape, Slide & Light projection. Duration: ca.12'. Commissioned by ELISION. Performed by Stephen Morey, ELISION Concert, Melba Hall, The University of Melbourne, May 6, 1987. On CD: "Ossia (Volume 1)" (Evasound Records Jade JADCD1024), available from the Australian Music Centre [Sounds Australian].

Solar Dust (1988). Solo (Amplified) Mandolin. Duration: ca.10'. Commissioned by Adrian Hooper and The Sydney Mandolins. Performed by Paul Hooper, Netherlands Uniting Church, Quarry Street, Ultimo, Sydney, September 9, 1988 [Première]. On CD: "Earth Spirit" (Evasound Records Jade JADE1013), available from the Australian Music Centre [Sounds Australian].

Cathy's Song (1988). Encore piece for Solo Sopranino (or Alto) Recorder. Duration: ca.1'. To be published by Currency Press in 1993. Performed by Ian Shanahan, "Recorders Unlimited", University of Sydney, December 8, 1989. On CD: "Times Remembered" (Evasound Records Jade JADCD1022), available from the Australian Music Centre [Sounds Australian].

Cycles of Vega (1988–1990). E♭ Clarinet, 2 Percussion. Duration: ca.10'. Commissioned by Roslyn Dunlop. Performed by Roslyn Dunlop (E♭ Cl.), Daryl Pratt and Anthony Cowdroy (Perc.), the Second Sydney Spring International Festival of New Music, Sydney Art Gallery, November 2, 1991 [Première].

Gahu (1989). For Young Musicians. Tape or 8 Percussion/Orff Schulwerk. Duration: ca.10'. Unperformed. *

Helical Ribbon (1990). A Terse Étude for Solo Alto Recorder. Duration: ca.40". To be published by Currency Press in 1993. Commissioned by the Australian Music Centre [Sounds Australian]. Performed by Ian Shanahan, Australian New Music Conference, Brisbane, August 1990. On CD: "Times Remembered" (Evasound Records Jade JADCD1022), available from the Australian Music Centre [Sounds Australian].

Lingua Silens Florum (1991). Solo Prepared Alto Recorder. Duration: ca.50". To be published by Red House Editions in 1993. Performed by Ian Shanahan, Eric Gross Farewell Concert, Everest Theatre, University of Sydney, August 8, 1991 [Première]. On CD: "Splendour of the Past" (Evasound Records Jade JADCD1025), available from the Australian Music Centre [Sounds Australian].

Ritual Canons (1982/1993). 3 Bass Tubas, 1 Contrabass Tuba. Duration: ca.4'. To be premiered during the Festival of Sydney, 1994.

αἰθερος μελος – Microcosm (1991/1993). E♭ Clarinet, 2 Percussion, Contrabass. Duration: ca.1¼'. Commissioned by australYSIS. Preliminary version performed by Peter Jenkin (E♭ Cl.), Daryl Pratt (Perc.) and Roger Dean (CB.), Joseph Post Auditorium, Sydney Conservatorium of Music, July 9, 1991.

Lines of Light: Seven Improvisations on αἰθερος μελος (1991/1993). (Amplified) Recorders [1 player], Yamaha DX7 Synthesizer(s) [1 player], Percussion. Duration: ca.9½'. Commissioned by australYSIS. Performed by Ian Shanahan (Recs.), Roger Dean (Synth(s).) and Daryl Pratt (Perc.), Joseph Post Auditorium, Sydney Conservatorium of Music, November 27, 1993 [Première].

Dimensiones Paradisi (1991–1993). Solo Alto Flute. Duration ca.7'. Commissioned by Laura Chislett. To be premiered by Laura Chislett during 1994. {A facsimile of the manuscript of an earlier version for solo piccolo was published in *Context* No.2 pp.38–43, Summer 1991.}

Gate of Remembrance (1993). Solo (Amplified) Piano. Duration ca.14'. Commissioned by Roger Woodward. To be premiered by Roger Woodward during the 5th Sydney Spring International Festival of New Music (1994).

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## DISCOGRAPHY

1. Compact Disc: "Music from St Michael's, Vacluse, Sydney and St Andrew's Cathedral, Sydney".  
Evasound Records Jade JADCD1012.  
Robert Allworth: *How Many Sunsets Will I See?* Ian Shanahan (Alto Rec.), Paul Hooper (Mand.).  
Released in Australia, the U.S.A. and Europe through EMI, April 1990.
2. Compact Disc: "Earth Spirit". Evasound Records Jade JADE1013.  
Ian Shanahan: *Solar Dust* Paul Hooper (Mand.).  
Ian Shanahan: *Echoes/Fantasies* Nigel Westlake (Bass Clar.), Michael Askill (Perc.).  
Released in Australia, the U.S.A. and Europe through EMI, August 1990.
3. Compact Disc: "Times Remembered". Evasound Records Jade JADCD1022.  
Ian Shanahan: *Cathy's Song* Ian Shanahan (Sopranino Rec.).  
Ian Shanahan: *Helical Ribbon* Ian Shanahan (Alto Rec.).  
Released in Australia, the U.S.A. and Europe through EMI, June 1991.
4. Compact Disc: "Ossia (Volume 1)". Evasound Records Jade JADCD1024.  
Ian Shanahan: *Arcturus Timespace* Stephen Morey (Mand., Perc.).  
Released in Australia, the U.S.A. and Europe through EMI, April 1992.
5. Compact Disc: "Splendour of the Past". Evasound Records Jade JADCD1025.  
Ian Shanahan: *Lingua Silens Florum* Ian Shanahan (Prepared Alto Rec.).  
Released in Australia, the U.S.A. and Europe through EMI, April 1992.
6. Compact Disc: "River Songs". Evasound Records Jade JADCD1026.  
Robert Allworth: *2 Bagatelles* Ian Shanahan (Soprano Rec.).  
Released in Australia, the U.S.A. and Europe through EMI, June 1992.
7. Compact Disc: "Where no Shadows Fall". Evasound Records Jade JADCD1031.  
Peter Sculthorpe: *A Sun Song for Eric* Ian Shanahan (Alto Rec.), Dominique Guerbois (Vln.), Susan Blake (Vlc.).  
Released in Australia, the U.S.A. and Europe through EMI, November 1992.
8. Compact Disc: "Concerto". Evasound Records Jade JADCD1038.  
Robert Allworth: *2 Bagatelles* Ian Shanahan (Soprano Rec.).  
Released in Australia, the U.S.A. and Europe through EMI, May 1993.
9. Compact Disc: "Music for a Champagne Breakfast". Evasound Records Jade JADCD1040.  
Ian Shanahan: *Pastels* Roslyn Dunlop (Clar. in A).  
Released in Australia, the U.S.A. and Europe through EMI, August 1993.

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